

QUALITY ASSURANCE PROJECT PLAN

REVISION: 02

ASHLAND/NSP LAKEFRONT
SUPERFUND SITE

ASHLAND, WISCONSIN



February 2004

URS
54 Park Place, Suite 950
Appleton, Wisconsin 54914
(920) 968-6900

URS Project No. 25687954

Ashland/NSP Lakefront Site – BRRTS# 02-02-000013

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List of Abbreviations

AC	Area of Concern
AOC	Administrative Order on Consent
BERA	Baseline Ecological Risk Assessment
ch. NR 140	WAC Chapter Natural Resources 140 - Groundwater Quality
ch. NR 720	WAC Chapter Natural Resources 720 - Soil Cleanup Standards
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	Chain of Custody
COCs	Compounds of Concern
CSTAG	Contaminated Sediment Technical Advisory Group
DMP	Data Management Plan
DNAPL	Dense Non Aqueous Phase Liquid
DQO	Data Quality Objective
EDD	Electronic Data Deliverables
EDMS	Electronic Data Management System
FS	Feasibility Study for Remedial Action Options
FSP	Field Sampling Plan
GIS	Geographic Information System
GMP	Good Manufacturing Practices
HHRA	Human Health Risk Assessment
HSP	Health and Safety Plan
IDW	Investigative Derived Waste
LAN	Local Area Network
LCS	Laboratory Control Sample
LIMS	Laboratory Information Management System
LOQ	Limit of Quantitation
LQM	Laboratory Quality Manual
MDL	Method Detection Limits
MGP	Manufactured Gas Plant
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MSL	Mean Sea Level
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NLS	Northern Lake Service
NSP	Northern States Power Company
OSHA	Occupational Safety and Health Administration
PAH	Polynuclear Aromatic Hydrocarbons
PE	Professional Engineer
PG	Professional Geologist
PID	Photoionization Detector
PMP	Project Management Plan

PRGs Preliminary Remediation Goals

QA Quality Assurance

List of Abbreviations (continued)

QAM Quality Assurance Manual

QAPP Quality Assurance Project Plan

QC Quality Control

RI Remedial Investigation

RL Reporting Limit

RPD Relative Percent Difference

RSD Relative Standard Deviation

SDG Sample Delivery Group

SOP Standard Operating Procedure

SOW Statement of Work

STL Severn Trent Laboratory

SVOC Semi-Volatile Organic Compound

TCLP Toxicity Characteristic Leaching Procedure

TSA Technical System Audit

TWA Time Weighted Average

USEPA United States Environmental Protection Agency

VOC Volatile Organic Compound

WAC Wisconsin Administrative Code

WDNR Wisconsin Department of Natural Resources

WWTP Wastewater Treatment Plant

1.0 PROJECT MANAGEMENT

This Quality Assurance Project Plan (QAPP) describes procedures to be followed and details related to quality assurance (QA) and quality control (QC) for additional characterization of the Ashland/NSP Lakefront Superfund Site (the “Site”). The Site contains property owned by Northern States Power Company, a Wisconsin corporation (d.b.a. Xcel Energy, a subsidiary of Xcel Energy Inc. (“NSP”)), a portion of Kreher Park¹, a City owned property fronting on the bay, the former City Waste Water Treatment Plant (WWTP), also located at Kreher Park, and an inlet area containing contaminated sediment directly offshore from the former WWTP. The Site includes four impacted areas. These include: (1) a filled ravine on the NSP property that formerly opened to the lakeshore prior to the filling of the present Kreher Park; (2) a deep confined aquifer, the Copper Falls, separated from the near surface fill soils by the Miller Creek Formation, a silty clay aquitard; (3) Kreher Park and the former WWTP; and (4) the affected offshore sediments. The primary contaminants at each area are coal tar/creosote like compounds, volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs).

The QA/QC requirements for this project are described in this section. Once approved, this QAPP will govern all data collection efforts undertaken by URS on behalf of NSP including any on-going groundwater monitoring and site investigative activities. This QAPP will be used in conjunction with the following other Remedial Investigation/Feasibility Study (RI/FS) project documents:

- Project (Site) Management Plan (PMP)
- Health and Safety Plan (HSP)
- Field Sampling Plan (FSP)
- Data Management Plan (DMP)

This QAPP has been revised to incorporate United States Environmental Protection Agency (USEPA) comments presented in a meeting (January 8, 2004). This QAPP was previously revised (Revision 01) following the USEPA review of the November 2003 draft QAPP (Revision

¹ Reference to this portion of the Site as Kreher Park developed colloquially over the course of this project. Kreher Park consists of a swimming beach, a boat landing, an RV park and adjoining open space east of Prentice Avenue, lying to the east of the subject study area of the Site. For purposes of this work plan and to be consistent with past

00). Additional revisions to this QAPP will continue to be made as needed following change in scope of work, USEPA review, or for inclusion of applicable procedures for remedial actions.

QA/QC addresses the procedures involved in the collection, preservation, packaging, and transport of samples; field testing; record keeping; data management; chain-of-custody procedures; laboratory analyses; and other necessary matters to ensure that sample collection, once completed, will yield data with integrity that can be defended. Generally, QC is concerned with the day-to-day efforts to verify that site-specific activities are in conformance with approved plans, procedures, and specifications. Conversely, QA is the implementation and monitoring of the performance of QC activities, such as performance and system audits.

Adherence to Standard Operating Procedures (SOPs) provided in Appendix A by project personnel, supervision of key tasks by experienced personnel, and inspections or audits of selected field and laboratory activities will collectively serve to ensure the integrity of project results and meet the QA/QC requirements appropriate for this project.

Predominant field activities that will take place during the RI/FS include the collection and analysis of groundwater samples from existing monitoring and artesian wells, surface and subsurface soils, soil vapor gas, test pits, and surface and subsurface sediment. A discussion of the field procedures and QA/QC protocols are presented in this report; reference is frequently made to SOPs, which are presented in Appendix A. The FSP for the Site (February 2004) also contains the rationale for the number and types of environmental samples to be collected during the field investigation; the rationale for the selection of sampling locations; a description of procedures to be used for collection, preservation, packaging, and transport of environmental samples; documentation requirements for sample activities and sample custody; procedures for decontamination of environmental sampling equipment; and procedures for disposal of Investigative Derived Waste (IDW).

The field QC procedures which will be followed to ensure that field activities are properly documented and performed are described in this report. QC procedures described in this report include:

reports referenced in this plan, the portion of the Site to the west of Prentice Avenue, east of Ellis Avenue and north of the NSP property is referred to as the "Kreher Park Area" or simply Kreher Park.

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- Sample collection procedures
 - Documentation of field activities
 - Calibration procedures and equipment
 - Sample container preparation
 - Chain-of-custody procedures
 - Collection of quality control samples
 - Laboratory analysis

All site activities will be completed in accordance with USEPA-approved work plans. These work plans will include a description of the sample collection methods, number and location of samples, and laboratory analysis that will be performed. Additional areas of investigation have been identified during technical meetings among Wisconsin Department of Natural Resources (WDNR), USEPA and NSP on November 4 and November 19, 2002, January 6, 2003, and January 8, 2004 are reflected in the scope of work proposed in the RI/FS Work Plan submitted concurrent with this document.

1.1 QAPP PREPARATION GUIDELINES

This QAPP is prepared in accordance with the following documents:

- United States Environmental Protection Agency. *Test Methods for Evaluating Solid Waste. Office of Solid Waste and Emergency Response.* Washington, D.C. Third Edition, April 1998.
- United States Environmental Protection Agency. *Guidance for the Data Quality Objectives Process.* EPA QA/G-4. EPA/600/R-96/055. USEPA Office of Environmental Information, Washington, D.C. August 2000.
- United States Environmental Protection Agency, Region 5. *“Instructions on the Preparation of a Superfund Division Quality Assurance Project Plan.”* Revision 0, June 2000.
- United States Environmental Protection Agency. *Guidance for Quality Assurance Project Plans.* EPA QA/R-5. EPA/240/R-02/009. USEPA Office of Environmental Information, Washington, D.C. December 2002.

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- United States Environmental Protection Agency. *Guidance on Environmental Data Verification and Data Validation*. EPA QA/G-8. EPA/240/R-02/004. USEPA Office of Environmental Information, Washington, D.C. November 2002.
 - United States Environmental Protection Agency. *Guidance on Data Quality Assessment*. EPA. QA/G-9. EPA/600/R-96/084. USEPA Office of Environmental Information, Washington, D.C. July 2000.
 - United States Environmental Protection Agency. USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. EPA-540/R-99-008, October 1999.
 - United States Environmental Protection Agency. *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. EPA-540/R-01-008. July 2002.
 - United States Environmental Protection Agency. *Region 9 Preliminary Remediation Goals (PRGs)*. USEPA, Region 9. October 2002.

1.2 PROJECT ORGANIZATION AND MANAGEMENT

The project organization and responsibilities of key individuals of the URS project team are described below. URS has subcontracted with NewFields for project management activities. The project will be coordinated out of the URS Appleton office with Project Management from the NewFields Madison office. Field personnel from the URS Madison office will also perform the various field activities for the project.

Project leadership and primary staff will be composed of personnel familiar with anticipated activities. The URS project team will provide experience in hydrogeologic analysis, environmental engineering, risk assessment, and remedial design. Brief descriptions of key project team members follow.

Project Coordinator

Mr. Bert Cole will serve as the URS project coordinator. Mr. Cole is a Senior Environmental Engineer with more than 29 years of experience in the environmental field. The Project Coordinator is responsible for the overall quality of the project, along with the oversight of subcontractors and tracking budgets. The Project Coordinator will also work with the Project

Manager in developing schedules and work plans, establishment of project policies and procedures, and review and analyze overall task performance.

Project Manager

David Trainor, P.E., P.G., of NewFields will function as Project Manager for the project, as a subcontractor to URS. Mr. Trainor has more than 25 years of experience in the environmental field. Mr. Trainor has served as the Project Manager for the NSP/Ashland Lakefront project since the initial investigation was completed in 1995. The Project Manager is responsible for managing the project, and has the authority to commit the resources necessary to meet project objectives and requirements. The Project Manager's primary function is to ensure that technical, financial, and scheduling objectives are achieved. The Project Manager will provide the major point of contact and control for matters concerning the project, and will be responsible for the following:

- Define project objectives to develop detailed schedules for work plans
- Develop and implement work plans, schedules, and adherence to management-developed study requirements
- Establish project policies and procedures to address the specific needs of the project as a whole, as well as the objectives of each task
- Acquire and apply technical and corporate resources as needed to ensure performance within budget and schedule constraints
- Coordinate and manage field staff that are collecting soil and groundwater samples and supervising drilling activities
- Orient all field leaders and support staff concerning the project's special considerations
- Provide day-to-day coordination on technical issues in specific areas of expertise with the field managers
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product
- Review the work performed on each task to ensure its quality, responsiveness, and timeliness
- Review and analyze overall task performance with respect to planned requirements and authorizations
- Represent the project team at meetings and public hearings

QA Manager

The URS QA Manager has overall responsibility for verifying that the project meets Agency and PRP objectives and URS's quality standards. She will be responsible for overall technical supervision and QA/QC. Ms. Susanne Tomajko will serve as the QA Manager for this project and will be responsible for the following:

- Preparation, review and approval of the QAPP
- Coordinating data validation, data assessment, and internal and external system audits
- Overall technical supervision and QA/QC
- Approving all external reports (deliverables) before their submission to the Agency
- Preparing quality of interim and final reports

Field Manager(s)

Field Manager(s) will be responsible for performing field measurements, supervising drilling and well installation activities, preparing field boring logs, collecting soil samples, collecting groundwater samples, preparing samples for shipment, and documenting field conditions and observations. Field managers will be experienced professionals who possess the technical competence to effectively perform the required work. Field Managers will also identify any problems at the Site and discuss resolutions of potential problems with the Project Manager. Field Managers will report directly to the Project Manager. Field Manager responsibilities include:

- Implementation of QA/QC procedures required by the Field Manager
- Adherence to work schedules provided by the project director
- Review of text and graphics required for site activities
- Coordination and oversight of technical efforts of sub-contractors assisting the field team
- Identification of problems in the field, and discussion of resolutions with the project director
- Assistance with data analysis and report preparation

QAPP Preparer

The URS Chicago (IL) office is responsible for preparation of this QAPP.

Data Validators

The URS Chicago (IL) office, with support from the URS Cleveland (OH) and URS Buffalo (NY) office, is responsible for data validation.

1.3 LABORATORY SERVICES

Analytical laboratory services for this project will be provided by Northern Lake Service, Inc. (NLS) of Crandon, Wisconsin and Severn Trent Services, Inc. (STL) of Knoxville, Tennessee. NLS will provide analytical services for all soil and groundwater samples. STL will provide analytical services for soil gas and vapor intrusion samples.

The testing laboratories for the sediment toxicity testing, pore water chemistry, biological tissue analyses, and benthic community evaluations have not been selected yet. The laboratories will be selected following a reconnaissance survey of the inlet sediment. An addendum to this QAPP will then be submitted to USEPA detailing quality assurance practices of the selected laboratories.

The analytical laboratories' addresses and NSP Project Managers are as follows:

Northern Lake Service, Inc
400 North Lake Avenue
Crandon, Wisconsin 54520
Phone: (715) 478-2777
Contact: Mr. Steve Mlejneck

STL Knoxville
5815 Middlebrook Pike
Knoxville, Tennessee 37921
Phone: (865) 291-3000
Contact: Ms. Jaime McKinney

The NLS and STL Project Managers for this project will be Mr. Steve Mlejnek and Ms. Jaime McKinnery, respectively. NLS's organization and responsibilities are described in detail in NLS's

QA/QC Manual included in Appendix B. Similarly, STL's QA/QC practices and policies are described in the laboratory-specific Laboratory Quality Manual (LQM) included in Appendix C.

A brief summary of the laboratories' organization and responsibilities is as follows:

Laboratory Project Manager

- Coordinates the completion and delivery of the final analytical report
- Ensures that client objectives are met
- Oversees the overall completeness of the final analytical report

Laboratory Inorganic and Organic Operations Supervisors

- Directs the laboratory's analytical programs
- Coordinates projects and associated workloads
- Executes laboratory administrative functions
- Ensures compliance with appropriate analytical methods

Laboratory Quality Assurance Officer/Manager

- Overview laboratory quality assurance
- Overview QA/QC documentation
- Overseeing of detailed data review
- Decides laboratory corrective actions, if required
- Technical representation of laboratory QA procedures
- Preparation of laboratory SOPs
- Approval of Quality Assurance Manuals

Laboratory Analysts

- Responsible for equipment maintenance and calibration
- Assume direct responsibility for data generation
- Self-review of generated data
- Documentation of sample analysis anomalies

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- Inclusion of appropriate quality control samples in accordance with laboratory SOPs

Laboratory Sample Custodians

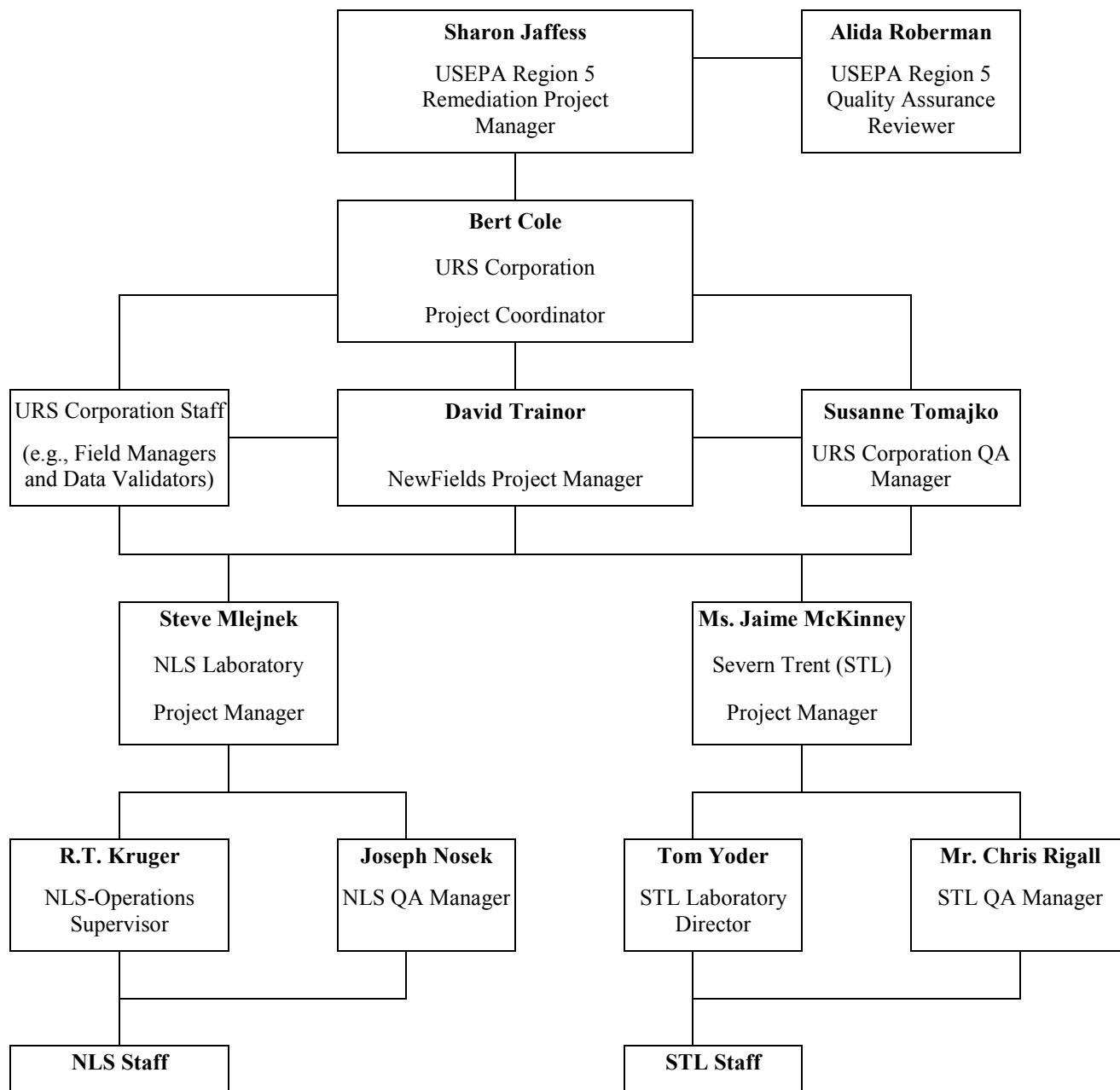
- Receive and inspect the incoming sample and containers
- Record the condition of the incoming sample containers
- Sign appropriate custody documents
- Verify chain of custody and its correctness
- Notify laboratory project manager and laboratory analysts of sample receipt and inspection
- Assign a unique identification number and customer number, and enter each into the data management system
- Arrange proper secure sample storage

The primary responsibility for project quality rests with the URS Project Manager. Independent QA will be provided by each laboratory Project Manager, the Inorganic Operations Supervisor, the Organic Operations Supervisor, the laboratories' Quality Assurance Officer/Manager, laboratory analysts, and Laboratory Sample Custodians as required prior to release of all data to URS.

1.4 ORGANIZATIONAL CHART

The following organizational chart shows the relationships and the lines of communication among the project participants.

**ASHLAND NSP LAKEFRONT SUPERFUND SITE
ORGANIZATIONAL CHART**



2.0 PROBLEM DEFINITION AND BACKGROUND INFORMATION

2.1 PROBLEM DEFINITION

The Site consists of approximately 20 acres of affected land located on the shore of Chequamegon Bay of Lake Superior, in Ashland, Wisconsin (Figures 1 and 2). The NSP property, located on an upland area above a bluff face fronting on Kreher Park, is the site of a former manufactured gas plant (MGP) that operated between 1885 and 1947. Kreher Park includes reclaimed lands from the bay filled during the 1800s when the area was the site of major lumbering operations. The most significant of these operations was the John Schroeder Lumber Company, which operated a sawmill, a planing mill, a wood treatment facility and a shipping facility on the lakefront between 1901 and 1939. Uncontrolled filling of this area continued in the 1940s and 1950s when the property was owned by the City of Ashland and used as a waste disposal site.

A detailed description of the Site is presented in the Section 2.2. Contamination can be divided into the following areas of concern (AC) as follows:

- **Upper Bluff / Filled Ravine (AC 1)** – Consists of soil and groundwater contamination, and free phase coal tar within the backfilled ravine on the NSP property.
- **Copper Falls Aquifer (AC 2)** – Consists of groundwater contamination and free phase coal tar in the Copper Falls aquifer originating on the NSP property.
- **Kreher Park (AC 3)** – Consists of soil and groundwater contamination in the fill material in Kreher Park.
- **Chequamegon Bay (AC 4)** – Consists of sediment contamination in the near shore area of Chequamegon Bay adjacent to Kreher Park.

The areas of concern are shown on Figure 3.

The primary contaminants at each area, generally, are coal tar/creosote like compounds, VOCs and PAHs. The most common chemicals from each of these parameter groups includes benzene and naphthalene. Soils and groundwater contaminated with these compounds are present at the backfill ravine and Kreher Park. In addition, free-product coal tar, present as a dense non-aqueous phase liquid (DNAPL), is found in the upper reaches of the ravine on the NSP property,

and at Kreher Park where an underground clay tile that extended the length of the ravine intermittently discharged at the surface at the “seep” area of the Park. Free-product coal tar is also found in the upper deposits of the Copper Falls Aquifer. This free-product has resulted in a dissolved phase plume that extends north from the area of the free-product in the direction of groundwater flow, beyond the shoreline of the Bay. However, the Miller Creek Aquifer prevents cross-contamination from Copper Falls to Kreher Park. Free-product is also present in the sediments. The area of affected sediments covers approximately nine acres. It is within these sediments where the highest contaminant levels of VOCs and PAHs have been found.

As described in Section 2.3, several phases of investigation have been completed, and two interim remedial responses have been implemented by NSP. A series of technical meetings were held during the fall and winter of 2002/2003, and in January 2004 among NSP, WDNR and USEPA to discuss these RI activities for further site characterization. Because of seasonal weather, access constraints and the need to meet the winter deadline for “ice-out,” the first of these RI activities included supplementary sediment sampling on the bay sediments for further physical characterization of these sediments. In accordance with USEPA approval, WDNR implemented an investigation of the sediments during March 2003, to allow easy access from winter ice.

During this same timeframe (i.e., fall/winter 2002-2003), NSP began discussions with USEPA and WDNR regarding work that NSP was prepared to implement. Following discussions with USEPA in early 2003, NSP was informally notified that USEPA would seek that NSP enter into an Administrative Order on Consent (AOC) for performance of the RI/FS at the Site. The formal General Notice letter and proposed AOC with an attached Statement of Work (SOW) was received by NSP on August 8, 2003. Subsequently, on January 19, 2004, the USEPA issued the final AOC/SOW to NSP.

The SOW requires submittal of a Remedial Investigation/Feasibility Study (“RI/FS”) Work Plan. A draft RI/FS Work Plan was developed and submitted to USEPA concurrent with Revision 00 of the QAPP. These documents were prepared and submitted prior to finalizing the AOC/SOW between USEPA and NSP on January 19, 2004, so that an early USEPA review could be initiated in 2003 to minimize delay in field activities. Implementation of the final SOW, as presented in the revised RI/FS Work Plan (February 2004) and this QAPP contingent upon final

USEPA approval. In addition to the revised RI/FS Work Plan the following submittals are required by the January 2004 AOC/SOW:

- Project (Site) Management Plan (PMP)
- Health and Safety Plan (HSP)
- Field Sampling Plan (FSP)
- Data Management Plan (DMP)

This QAPP has been revised to reflect QA/QC procedures required to complete tasks for the RI/FS and for compliance with the AOC/SOW.

2.2 SITE DESCRIPTION

NSP operates an administration and service facility (storage for energy transmission, operation, and maintenance equipment) located at 301 Lake Shore Drive East in Ashland, Wisconsin. This property is at the location of a former Manufactured Gas Plant (MGP) that was operated by a predecessor company on the property between 1885 and 1947. The former gas plant building has been incorporated into the current service facility, which is a block long “U” shaped building south of St. Claire Street. The former MGP building comprises the eastern one-third of this building. An administration office fronting on Lake Shore Drive and parking lot are located south of the service building on the same city block, separated by an alley.

The Site is located within the City Limits of Ashland, and generally surrounded by city streets. Lake Shore Drive (also U.S. Highway 2) bounds the Site to the south. Prentice Avenue and 3rd Avenue East bound the Site to the east and west, respectively. St. Claire Street bounds the Site to the north. NSP also owns undeveloped property to the north side of St. Claire Street between 3rd Avenue East and Prentice Avenue, south of Kreher Park, and a parcel of property on the northeast corner at the intersection of Prentice Avenue and St. Claire Street. Both parcels of property are fenced and used to store spare equipment and supplies.

Surrounding properties include: a grocery store and parking lot on the south side of Lake Shore Drive; Our Lady of The Lake’s church, school, and parking lot west of 3rd Avenue; residential homes on the north side of St. Claire Street between the two NSP storage yard properties, and

residential homes east of Prentice Avenue and the NSP property. Kreher Park and Chequamegon Bay are located north of the NSP storage yard properties and railway corridor.

The impacted area of Kreher Park area consists of a flat terrace adjacent to the Chequamegon Bay shoreline. The surface elevation of the park varies approximately 10 feet, from 601 feet MSL, to about 610 MSL at the base of the bluff overlooking the park. The bluff rises to an elevation of about 640 feet MSL, which corresponds to the approximate elevation of the NSP property. The lake elevation fluctuates about two feet, from 601 to 603 feet MSL. At the present time, the park area is predominantly grass covered. A gravel overflow parking area for the marina occupies the west end of the property, while a miniature golf facility formerly occupied the east end of the property. The former City of Ashland waste water treatment plant (WWTP) and associated structures fronts the bay inlet on the north side of the property. The impacted area of Kreher Park is bounded by Prentice Avenue and a jetty extension of Prentice Avenue to the east, the Wisconsin Central Limited railroad to the south, the Ellis Avenue and the marina extension of Ellis Avenue to the west, and Chequamegon Bay to the north. The impacted area of Kreher Park occupies approximately 13 acres.

The offshore area with impacted sediments is located in an inlet created by the Prentice Avenue jetty and marina extensions previously described. For the most part, contaminated sediments are confined in the inlet bounded by the northern edge of the line between the Prentice Avenue jetty and the marina extension. Contaminated sediment levels fall off beyond this boundary. The affected sediments consist of lake bottom sand and silts, and are overlain by a layer of wood chips, likely originating from former lumbering operations. The chips layer varies in thickness from 0 to seven feet, with an average thickness of nine inches. The entire area of impacted sediments encompasses approximately nine acres.

The Site location is shown on Figure 1, and Site features are shown on Figure 2.

2.3 BACKGROUND

Several phases of site investigation have been completed at the facility since 1995. These investigations identified soil and groundwater contamination on the NSP property. Results of the investigations show that a filled ravine is located on the property; the ravine is filled with cinders, ash, demolition material (bricks, concrete, etc.), and fill soil. This filled ravine begins at

Lake Shore Drive and opens to Kreher Park. Because the fill material is more permeable than the surrounding Miller Creek till (the surficial unconsolidated geologic unit at the Site), the saturated portion of the ravine fill behaves as a perched aquifer. The Miller Creek till is composed of a fine grained low permeability silty clay. Coal tar has been encountered in wells MW-9, TW-13, and MW-15 screened within the backfilled ravine. Coal tar constituents in the soil within the backfilled ravine exceeds Wisconsin Administrative Code NR chapter 720 soil cleanup standards, and contaminants in the groundwater within the ravine exceeds Wisconsin Administrative Code chapter NR 140 groundwater quality standards.

Site investigation results also show that coal tar migrated vertically into the underlying Copper Falls aquifer. The Copper Falls aquifer in the area of the former MGP is a confined aquifer with strong upward vertical gradients. The Miller Creek formation behaves as an aquitard, or confining unit for the Copper Falls aquifer. These upward vertical gradients have limited the vertical migration of coal tar, minimizing downward movement of the coal tar through the depth of the Copper Falls aquifer. However, the long-term presence of the tar in the aquifer (since the early operation of the MGP) has resulted in a plume of dissolved contaminants in the groundwater extending north beneath Kreher Park. Groundwater within the identified plume is not currently being used as a potable water supply, or is a threat to the City of Ashland's drinking water source (Lake Superior).

Because the coal tar source area is limited to a small area west of the former plant building, in the courtyard area of the service facility immediately south of St. Claire Street, URS, on behalf of NSP, designed, coordinated the construction, and is overseeing the operation of a coal tar recovery system for the Copper Falls Aquifer as an interim response. This remediation system was constructed on NSP property, and is currently extracting coal tar from the underlying aquifer. The system is also capable of treating groundwater that is removed concurrent with the removal of the tar. Coal tar is separated and collected in a holding tank, and then transported off-site for proper disposal. Water is treated in accordance with standards set by the City of Ashland, and discharged to the City's sanitary sewer system. (Treating groundwater is a secondary function of the system, compared to its primary function of coal tar extraction and separation.)

The interim response coal tar recovery system was installed in the fall of 2000, and became fully operational in January 2001. More than 5,000 gallons of coal tar has been removed, and nearly

750,000 gallons of contaminated groundwater has been treated between January 2001 and July 2003. Influent and effluent air monitoring results indicate the air diffuser and vapor phase carbon adsorption systems are effectively removing volatile organic contaminants discharged by the air diffuser. Influent and effluent water samples indicate that the air diffuser and liquid phase carbon units are effectively treating contaminated groundwater prior to discharge to the sanitary sewer.

During the spring of 2002, NSP implemented a second interim action on groundwater migrating through the buried ravine. This interim action was implemented to capture groundwater migrating through and around a clay tile that had likely been installed at the base of the ravine in the late 1800's prior to its filling. Through several subsurface investigations at both Kreher Park as well as on the NSP property, this tile was determined to be a source of an intermittent groundwater discharge near the mouth of the ravine on the park property, referred to as the "seep." Samples from the seep had yielded high levels of coal tar constituents. As a result, NSP installed an extraction well screened to intercept the base of the former ravine at its mouth at the north boundary of its property. The discharge from this well is routed to the existing water treatment system, where it is treated along with contaminated groundwater from the Copper Falls aquifer prior to discharge to a sanitary sewer. Additionally this second interim action included the removal of contaminated surface soils in the seep area, and the installation of a compacted clay barrier at Kreher Park as a further measure to protect from potential direct human and terrestrial wildlife contact.

Groundwater samples have been collected from piezometers screened in the Copper Falls Aquifer quarterly since September 2000. Results are summarized in quarterly reports submitted to the WDNR. Groundwater monitoring results indicate that the presence of coal tar in the Copper Falls Aquifer potentially impacted groundwater quality in the vicinity of the former MGP. The primary chemicals of regulatory concern include benzene, ethylbenzene, naphthalene, toluene, total trimethylbenzenes, and total xylenes. Several PAH chemicals (e.g., benzo(b)fluoranthene, benzo(a)pyrene, chrysene) have also been detected in samples above groundwater quality standards. Since the coal tar recovery system has been in operation, eight additional piezometers were installed in the Copper Falls formation (six in February 2002 and two in June 2002), to further characterize the contaminant distribution pattern in the Copper Falls formation. The locations of existing monitoring wells, piezometers and relevant soil borings are shown on Figures 4 through 5.

2.4 POTENTIAL CONTAMINANTS

MGP operations historically conducted at the site resulted in the creation of coal tar as a co-product. Coal tar is a dark, oily material that had various commercial uses. Some tar was sold or reused as boiler fuel, but some tar was also released to the environment during the operational life of the MGP.

The Schroeder Lumber Company occupied the Kreher Park property between 1901 and 1939 as a sawmill/wood processing facility. Evidence indicates Schroeder conducted wood treatment at the site using coal tar/creosote material. Following Schroeder's active tenure, Ashland County acquired the property in 1939. In 1942, Ashland County transferred title of the former Schroeder Lumber Company property to the City of Ashland, and the City has owned the land since that time. In the 1940's the City operated the northwest portion of Kreher Park as a waste disposal facility (landfill). In 1951, the City constructed a wastewater treatment plant (WWTP) on the property, maintaining the plant until 1989. At that time, the City abandoned the plant because coal tar or wood treatment residual contamination was found in an area of the Park that had been proposed for plant expansion. The extension of the Ellis Avenue marina was completed in the mid-1980's.

Previous analytical results have indicated the presence of VOCs, SVOCs, and metals. Many of these compounds are typically associated with one or more of the above-mentioned potential sources of contamination.

Compounds typically associated with manufactured gas plants byproducts and waste include metals, VOCs, and SVOCs, along with ammonia, cyanide, nitrate, sulfate, and sulfide. Wood treatment and preservation methods often included the use of coal tar/kerosene mixtures or creosote (actively distilled from coal tar). Creosote is comprised primarily of various PAHs. The waste materials deposited on site have reportedly included slab-wood, sawdust, fly ash and municipal solid and industrial waste. These various materials have helped to define the potential contaminants at the site.

3.0 PROJECT TASK DESCRIPTION

3.1 DATA QUALITY OBJECTIVES

DQOs have been prepared to ensure that data proposed for collection would be of sufficient quality, appropriate for the intended uses, and useful in meeting RI/FS objectives for all areas of concern. DQOs for AC 1, AC 2 and AC 3 include the following:

AC 1, AC 2, and AC 3

- Utilize laboratory procedures and the appropriate analytical support (i.e. data validation) for identifying contamination consistent with the levels for remedial action objectives identified in the National Contingency Plan;
- Identify the vertical and lateral extent of soil and groundwater contamination in the Upper Bluff / Filled Ravine, the vertical and lateral extent of groundwater contamination in the Copper Falls Aquifer, the lateral extent of soil and groundwater contamination at Kreher Park, and the lateral and vertical extent of sediment contamination for the Chequamegon Bay Inlet utilizing historical and RI generated data;
- Further characterize the lateral and vertical extent of DNAPL in each AC;
- Utilize historical and RI generated site data to interpret geologic and hydrogeologic conditions with respect to evaluating contaminant migration pathways and the fate and transport of contaminants;
- Generate laboratory data with appropriate detection limits to compare to media specific cleanup standards and to assess attainment of risk-based criteria;
- To utilize historic and RI generated data necessary to perform human health and ecological risk assessments;
- To utilize historic and RI generated data necessary to develop site specific cleanup standards protective of human health and the environment; and,
- To utilize historic and RI generated data for the evaluation of potential remedial alternatives that will achieve site-specific cleanup standards protective of human health and the environment.

AC 4

DQOs for AC 4 are developed in accordance with agreements made at the Technical Scoping meeting (January 8, 2004), and include two alternatives for the investigation of the affected sediments. The first of these includes the following sampling design strategy:

- Implementing a sediment triad design strategy that will evaluate chemical, biological and toxicological indices for sediment dwelling organisms; these lines of evidence supplement traditional sediment analytical data to provide a site-specific risk assessment; studies of the benthic community, pore-water and sediment chemistry and substrate toxicity will be performed. A total of 12 sampling stations within the affected area, along with four reference stations outside the area are tentatively recommended (a reconnaissance survey will be initially performed to finalize sample stations);
- Collecting fish tissue residues to support a baseline human health risk assessment;
- Implement a sediment stability analyses that will include both a quantitative (modeling) and an empirical evaluation of sediment stability as recommended by USEPA; the purpose of this study will be to determine if existing sediment to be eroded or buried; the results of the study will be used to apply to remedial analyses; and
- Conducting a baseline ecological risk assessment integrating the data developed from the Triad studies to further define the nature and extent of contamination from contaminants of concern (COCs) to historical sources.

The second alternative for study of the affected sediments recommends implementation and continuation of a problem formulation process with the active participation of all affected stakeholders. This process has been recommended both by USEPA in its recent Management of Contaminated Sediment Sites guidance (2002) and by USEPA's Contaminated Sediment Technical Advisory Group (CSTAG) following its Ashland visit in July 2002. As outlined, this approach recommends convening stakeholders in a series of workshops with the intent of finalizing a sampling strategy that will satisfy all parties.

A detailed sampling design strategy has been presented in Section 4.2.2 of the RI/FS Work Plan. A final Sediment Quality Triad sampling plan will be submitted for Agency review following the completion of a site reconnaissance to finalize sample locations (see Section 4.2.2). Proposed sample locations are shown on Figure 8.

The overall goal of the RI/FS process is to collect sufficient data to characterize the extent of contamination at the Site and provide a feasibility study for a range of potential remedial options leading to the USEPA's selection of a proposed remedial action for the Site. Additional site investigation data and historic site investigation data will be used to evaluate potential exposure pathways to review potential remedial alternatives protective of human health and the environment. Data collected during the RI, in addition to historic data, will be utilized with to meet specific objectives described in Section 1.5 of the RI/FS Work Plan.

3.2 TARGET PARAMETERS

Soil/sediment samples collected from the Site and Bay will be analyzed for one or more parameter groups (e.g., VOCs, SVOCs (which include PAHs) and metals) listed in Table 1. This table includes the USEPA Region 9 PRGs as project required action limits and target detection limits as shown in USEPA guidance, *Region 9 Preliminary Remediation Goals (PRGs)*. USEPA, *Region 9*, October, 2002.

All groundwater samples will be analyzed for VOCs, SVOCs, metals, and total cyanide. Specific target analytes are listed in Table 2. This table includes the USEPA Region 9 PRGs as project required action limits and maximum allowable detection limits (USEPA, 2002).

All soil gas and air samples will be analyzed for the VOCs listed in Tables 3 and 4, respectively. This table includes the target screening values as taken from the *Draft Guidance for Evaluating the Vapor Intrusion of Indoor Air Pathway from Groundwater and Soil* (USEPA, 2002a).

3.3 SAMPLING RATIONALE

As described in the RI/FS Work Plan and the FSP, soil samples in the Ravine Bluff/Backfill Area will be used to further characterize contamination in this area and the Copper Falls Aquifer Area. A field investigation will be completed in the vicinity of the former MGP and to document background conditions. Additional soil samples will be collected from Geoprobe borings advanced in the ravine fill unit. Surficial soil samples will be collected from unpaved areas around the former MGP facility to evaluate potential contamination in surficial soils for the direct contact risk to human health. Additional piezometers will be installed in the Copper Falls

Aquifer, and groundwater samples will be collected from the new wells. Ambient and background air samples will be collected near the Xcel Building. Soil gas will be collected to determine whether fugitive VOC emissions are migrating from the ravine fill to indoor areas. A detailed description of each task follows:

Surface Soil Samples

Soil samples will be collected from unpaved areas around the former MGP facility to evaluate potential contamination within the surficial soils for the direct contact risk to human health. Soil sample locations SS-1 through SS-12 are shown on Figure 2. Samples SS-1 through SS-8 will be collected from unpaved areas in the vicinity of the former MGP facility and filled ravine area. Samples collected from the SS-9, SS-10, SS-11, and SS-12 locations will be used to represent background conditions. The exact locations of these soil borings may differ in the field and are contingent on the accurate locating of underground and aboveground utilities and safety of the field personnel (URS and subcontractor). At each sample location, soil will be collected from a depth between 3 and 12-inches utilizing hand tools. Samples will be placed in laboratory containers, held on ice, and shipped to the laboratory along with a completed chain-of-custody form. Additional descriptions of sampling procedures for surface soils are found in Section 3.2 of the FSP.

One duplicate sample will be collected for every 10 surface soil samples. Table 5 includes a list of field and QC samples that will be collected for the project. A complete description of sampling methods and associated sample quality control, along with sample, sample handling and custody procedures are outlined in Section 5.

Geoprobe Soil Borings

The field investigation within the upper bluff and ravine fill area will include the collection of additional soil samples from Geoprobe soil borings advanced to the backfilled ravine and the collection of soil samples around the perimeter of the former MGP. The additional soil samples will be collected from approximately 38 Geoprobe borings advanced in a regular grid pattern south of St. Claire Street in the courtyard area, inside the portion of the Xcel Energy building between the courtyard and alley, and in the alley. Four borings will also be advanced inside the former MGP building south of well nest MW-8/8A. Soil sample locations are shown on Figure

11. Geoprobe borings will be advanced a minimum of five feet below the base of the filled ravine, or to a maximum depth of 20 feet. A minimum of three samples per boring will be collected for laboratory analysis. One sample will be collected from unsaturated zone. Field screening results will be used to collect a sample which indicates the highest concentration of contamination, or the base of the backfilled ravine if contamination is not encountered. The third sample will be collected from the deepest interval, or from the deepest interval where field screening indicates that contamination is not present.

Additional subsurface soil samples will also be collected from three Geoprobe borings to evaluate background conditions. Background subsurface soil samples will be collected at intervals of 5, 10, and 15 feet from three borings advanced on the Xcel Energy property south of the former MGP. These three borings will be advanced within 15 feet of the North side of Lakeshore Drive between Prentice and 3rd Avenues at locations 50, 100, and 150 feet west of Prentice Avenue. These three borings were selected to represent upgradient soil background conditions outside the limits of the filled ravine. Three samples per boring will be selected for laboratory analysis. The proposed subsurface sample locations are shown on FigureThe locations for these borings are illustrated in Figure 4 and 5.

In the Kreher Park area, subsurface soil samples will be collected from a total of approximately 12 Geoprobe borings advanced in the vicinity of the former seep area, and approximately 8 borings be advanced in the vicinity of well TW-11; additional borings will be advanced as needed. The purpose of these samples is to identify the lateral extent of free-phase hydrocarbons in these areas in these areas. The proposed subsurface soil sample locations are shown on Figure 4 and 5. All subsurface soil samples will be collected in accordance with the attached SOPs. Field screening results will be used to select soil samples for laboratory analysis.

One duplicate sample will be collected for every 10 subsurface soil samples. Table 5 includes a list of field and QC samples that will be collected for the project. A complete description of sampling methods and associated sample quality control, along with sample, sample handling and custody procedures are outlined in Section 5.

Soil Gas Vapor Sample Collection

Soil gas vapor samples will be collected from seven vapor probes that will be installed at the following locations in the Upper Bluff Area:

- From vapor monitoring probe VP-1 installed in the filled ravine area east of the Xcel Energy building near the southeast corner of the asphalt parking lot;
- From vapor monitoring probes VP-2S and VP-2D installed in the filled ravine along St. Clair Street north of the paved courtyard area;
- From vapor monitoring probes VP-3S, VP-3I, and VP-3D installed near well MW-2R in the Xcel Energy storage yard north of St. Claire Street; and
- From vapor monitoring probe VP-4 installed east of MW-2R and approximately 25-feet east of the edge of the filled ravine.

Two rounds of sampling will be conducted, one during the summer and the second during the winter. Samples will be collected from soil vapor probes located at the Site. The sample locations are shown on Figure 4.

Vapor Intrusion Sample Collection

Vapor intrusion samples will be collected from inside the Xcel Energy service center building from the lowest elevation adjacent to an exterior wall near well MW-15. A background sample will be collected in the vicinity of MW-15 to evaluate ambient air conditions at the Site. Two rounds of sampling will be conducted, one during the summer and the second during the winter. These air samples will be collected in accordance with the attached SOPs. The sample will be collected over a period of 24 hours using a regulator. The regulator is used to provide a time-weighted average (TWA). Once 24 hours has passed, the canister valve is closed and the valve cap replaced. The sample locations are shown on Figures 4 and 5.

Monitoring Well Installation

Additional monitoring wells will be installed in the Copper Falls Aquifer and in the upper most water bearing unit in Kreher Park. Piezometers will be installed in the Copper Falls Aquifer as follows:

- MW-7B will be installed adjacent to MW-7A in the former seep area at a depth of 55 feet below ground surface (20 feet deeper than MW-7A);

-
- MW-23A will be installed in Kreher Park north of MW-21A and west of MW-7A. Piezometer MW-23A will be installed at the Miller Creek / Copper Falls interface at an approximate depth of 35 feet below ground surface, or a minimum of five feet below the interface, whichever depth is shallower.
 - Piezometer MW-23B will be installed in Kreher Park adjacent to MW-23A at a depth 20 feet deeper than MW-23B (approximately 55 feet below ground surface).
 - MW-24A will be installed in Kreher Park near the intersection of Ellis Avenue and Marina Drive between Marina Drive and the Chequamegon Bay inlet shoreline. Piezometer MW-24A will be installed at the Miller Creek / Copper Falls interface at an approximate depth of 35 feet below ground surface, or a minimum of five feet below the interface, whichever depth is shallower.
 - MW-25A will be installed in Kreher Park near the center of Kreher Park between Marina Drive and the Chequamegon Bay inlet shoreline. Piezometer MW-25A will be installed at the Miller Creek / Copper Falls interface at an approximate depth of 35 feet below ground surface, or a minimum of five feet below the interface, whichever depth is shallower.
 - MW-26A will be installed in Kreher Park on the north side of the former waste water treatment plant between the former plant and the Chequamegon Bay inlet shoreline. Piezometer MW-26A will be installed at the Miller Creek / Copper Falls interface at an approximate depth of 35 feet below ground surface, a minimum of or five feet below the interface, whichever depth is shallower.

The locations of these wells are shown on Figures 6 and 7.

Additional water table observation wells will be installed in the upper most water bearing unit at Kreher Park as follows:

- MW-7R will be installed adjacent to piezometers MW-7A/MW-7B at the former seep area at an approximate depth of 15 feet below ground surface;

- MW-24 will be installed at Kreher Park near the intersection of Ellis Avenue and Marina Drive between Marina Drive and the Chequamegon Bay inlet shoreline adjacent to piezometer MW-24A at an approximate depth of 15 feet below ground surface;
- MW-25 will be installed at Kreher Park near the center of the Park between Marina Drive and the Chequamegon Bay inlet shoreline adjacent to piezometer MW-25A at an approximate depth of 15 feet below ground surface; and
- MW-26 will be installed at Kreher Park on the north side of the former waste water treatment plant between the former plant and the Chequamegon Bay inlet shoreline adjacent to piezometer MW-26A at an approximate depth of 15 feet below ground surface.

Additionally, small diameter piezometers with short well screens will be placed at the base of the fill adjacent to water table observation wells along the shoreline, and a staff gauge will be installed to evaluate the hydraulic connection between groundwater and surface water. Locations of proposed water table observation wells, piezometers, and the staff gauge are described below and shown on Figure 7.

Groundwater Sample Collection

Groundwater will be sampled from 16 monitoring wells screened in the ravine fill or Miller Creek Aquifer in the Upper Bluff Area, 41 monitoring wells screened in the Copper Falls Aquifer, and 6 monitoring wells screened in the Kreher Park fill aquifer. Monitoring wells in each area of concern are summarized below, and proposed well locations are shown in Figures 6 and 7.

Upper Bluff Area		
Miller Creek Formation Wells		Filled Ravine Wells
MW-8	MW-1	MW-7
MW-10	MW-2	MW-9
MW-11	MW-3	TW-13
MW-16	MW-4	MW-14
MW-17	MW-5	MW-15
	MW-6	

Copper Falls Aquifer Piezometers						
MW-2AR	MW-5B	MW-9A	MW-13C	MW-18B	MW-22A	MW-26A*
MW-2BR	MW-5C	MW-9B	MW-13D	MW-19A	MW-22B	MW-2A(NET)
MW-2C	MW-6A	MW-10A	MW-15A	MW-19B	MW-23A*	MW-2B(NET)
MW-4A	MW-7A	MW-10B	MW-15B	MW-20A	MW-23B*	AW-1
MW-4B	MW-7B*	MW-13A	MW-17A	MW-21A	MW-24A*	AW-2
MW-5A	MW-8A	MW-13B	MW-18A	MW-21B	MW-25A*	

* RI/FS Proposed Well

Kreher Park Wells	
MW-1 (NET)	TW-11
MW-2 (NET)	TW-12
MW-3 (NET)	MW-24*
MW-7R*	MW-25*
TW-9	MW-26*

* RI/FS Proposed Well

All wells will be sampled quarterly for six rounds for this remedial investigation. Prior to groundwater sample collection, static water levels will be measured in all Site wells with a water level indicator. The procedures for using the water level indicator are described in Standard Operating Procedure (SOP) 100 included in Appendix A. Each well will be purged with a dedicated bailer, or submersible pump. Purge volumes and the color, odor, and turbidity of each will be noted on field sampling forms. The condition of the well will also be recorded at the time of sample collection. The procedures for determining pH, specific conductance, and temperature are detailed in SOPs 110, 120, and 130 in Appendix A. The target parameters (field and laboratory analysis), and the frequency of monitoring is shown in Table 2.

One duplicate sample will be collected for every 10 groundwater samples. Table 5 includes a list of field and QC samples that will be collected for the project. A complete description of sampling methods and associated sample quality control, along with sample, sample handling and custody procedures are outlined in Section 5.

Miscellaneous Sample Collection

Exploration test pits will be excavated at Kreher Park to further characterize the limits of fill for the solid waste disposal and the former coal tar dump areas. Two test pits will be excavated on each side of the former solid waste disposal area (8 total), and two test pits will be excavated across a former sewer open sewer in this area. Test pits will also be excavated in the vicinity of the former coal tar dump to determine the lateral extent of contamination in this area. Two test pits will be excavated on the east and west sides, two in the center, one on the north side, and one on the south side of the former coal tar dump area (8 total). Additionally, three test pits will be excavated across former drainage ditches/culverts. As shown on Figure 3, a former open sewer drainage swale is located in the solid waste disposal area, and a former culvert/trench is located beneath the southwest corner of the waste water treatment plant north of the former coal tar dump, and a trench is located east of the former treatment plant. Proposed test pit locations are also shown on Figure 3.

Each test pit will be excavated to a depth between 6 and 8 feet. Material encountered in each test pit will be visually described, and photographed as needed. Test pits will be terminated when the limits of fill have been determined, or until obstructions or caving prevent additional excavation. Material removed from the test pits will be returned to the excavation. Grab samples of obvious solid waste material from the test pits will be collected, preserved and shipped for analysis for the Table 1 parameters. Based on these results, selected samples will be subjected to TCLP analyses for potential hazardous waste classification. Test pit soil samples will be collected in accordance with the attached SOPs.

3.4 ANALYTICAL PROCEDURES

Analytical laboratory services for all soil and groundwater samples will be provided by NLS (Crandon, Wisconsin). VOCs will be analyzed by SW846 Method 8260B, SVOCs by Method SW846 8270C, metals by SW846 Method 6010B/7471A, hexavalent chromium by Method 7196A, in accordance to procedures specified in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition* (SW-846), revised April 1998 (USEPA, 1998), and total cyanide by *Standard Methods for the Examination of Water and Wastewater* (18th Edition), Section 4500-CN-B. Where required, NLS will analyze groundwater samples for PAHs using

SW846 Method 8310 to achieve laboratory reporting limits that meet action required target levels. Procedures described in the NLS QA/QC Manual and project specific attachments will be followed for the completion of this project. These procedures include: analytical procedures; calibration procedures and frequencies; preventative maintenance; and, quality control checks and routines to assess precision, accuracy, and method detection limits. A copy of the NLS QA/QC Manual and project specific attachments is included in Appendix B.

Analytical laboratory services for all soil gas and vapor intrusion will be provided by STL (Knoxville, Tennessee). VOCs will be analyzed by Method TO-15 in accordance to procedures specified USEPA guidance, "*The Determination of Volatile Organic Compounds (VOCs) in Air Collected in SUMMA Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)*." Procedures described in the STL's Laboratory Quality Manual (LQM) and project specific attachments will be followed for the completion of this project. These procedures include: analytical procedures; calibration procedures and frequencies; preventative maintenance; and, quality control checks and routines to assess precision, accuracy, and method detection limits. A copy of the STL LQM and project specific attachments is included in Appendix C.

3.5 DATA VALIDATION

Data reduction, evaluation, and reporting of sample results by NLS and STL will be performed in accordance with the individual laboratory quality manuals and project specific attachments included. Upon receipt of data from each laboratory, URS will validate the all data to verify that the data are accurate and defensible. The data results will be reviewed against validation criteria established in the *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review*, Publication 9240.1-05A, EPA-540/IR-99/008, October 1999; and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, Publication 9240.1-05-01, EPA-540/R-94/013, EPA-540/R-01-008, July 2002, and the most current EPA Region V Standard Operating Procedures for validation of CLP organic (November 2002) and inorganic data (September 1993 or later). Method-specific procedures as outlined in the individual SW846 methods to be employed for this RI, will take precedence over CLP guidance. A Data Validation Report will be developed for submittal to USEPA after all data has been validated.

A complete description of data verification and data validation tasks and procedures is provided in Section 6.

3.6 QUALITY ASSURANCE ASSESSMENT

Internal QA evaluations will be conducted periodically throughout the project to ensure that usable data will be generated. Internal audits may be conducted by the QA officers from URS, NLS, and STL. A detailed description of the QA evaluation is presented in Section 5.

3.7 DATA USABILITY ASSESSMENT

Analytical data generated during the sampling events will be assessed against the DQOs established for these tasks. The DQO process followed the seven steps presented in Section 4.0, and established the DQOs for these tasks. Procedures to validate the data collected are included in Section 6.

3.8 PROJECT DOCUMENTS, RECORDS AND REPORTS

Field staff will keep detailed notes of field activities and results. All original documents will be retained in the project files in URS' Madison, Wisconsin office. Project documents that will be generated during these field activities will include field logbooks, well sampling forms, boring logs, well construction forms, well development forms, and chain of custody forms. Pertinent historic data and data collected during this investigation will be presented in a Remedial Action Investigation report, upon completion of all remedial action activities.

3.9 PROJECT SCHEDULE

RI/FS activities will begin with the submittal of the RI/FS Work Plan to the USEPA on February 18, 2004. Subject to schedule adjustments negotiated in the context of the AOC/SOW discussions, following review of the RI/FS Work Plan, a Final RI/FS Work Plan and associated Planning Documents will be submitted to the USEPA following receipt of USEPA's comments. Within 30 days of approval of these Plans, the RI activities will commence. It is estimated that RI activities for Area 1, Area 2, and Area 3 will be completed within 90 days, and activities for Area-4 will be completed within 180 days.

4.0 WORK PLAN RATIONALE

4.1 DATA QUALITY OBJECTIVE PROCESS

As described in Section 2.1, soil, groundwater, sediment, and surface water at the Site are contaminated with PAH compounds and VOCs. Inorganic compounds (metals and cyanide) have also been detected, but not at levels potentially harmful to human health and the environment. This contamination is the result of former activities completed on the NSP property, and activities completed on the Kreher Park Property. (A description of the Site and background information is also presented in Section 2.)

Historic site investigation and monitoring results, along with additional site characterization results (obtained upon the completion of the site investigation), will be used to evaluate potential remedial responses for the areas that have been characterized.

The seven steps of the DQO process are presented in Table 6.

4.2 MEASUREMENT PERFORMANCE CRITERIA - PARCC

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results that are in substantial compliance with the National Contingency Plan (NCP). Specific procedures for sampling, chain of custody, laboratory instruments calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this Plan and in documentation provided by each laboratory. NLS's QA/QC Manual and project specific attachments are included in Appendix B. The purpose of this section is to address the specific objectives for precision, accuracy, representativeness, completeness, and comparability related to the Ashland/NSP Lakefront Site Project. QA objectives for field measurements and laboratory measurement are included in Tables 7 and 8, respectively.

Trip blank, duplicate, and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling program. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage. Duplicate samples are analyzed to check for sampling and analytical reproducibility. Matrix spikes provide information about the effect of the sample matrix on the preparative and measurement

methodology. All matrix spikes are performed in duplicate and are hereinafter referred to as MS/MSD samples.

4.2.1 Precision

Precision is the ability to obtain the same result every time a sample is analyzed. Field precision is assessed through the collection and measurement of field duplicates at a rate of 1 duplicate per ten analytical samples. The RPD for each pair of duplicate analyses will be calculated as follows:

$$RPD = (S - D) / [(S + D) / 2] \times 100$$

Where S = original sample data; and
 D = duplicate sample data.

Precision in the laboratory is assessed through the calculation of relative percent differences (RPD) and relative standard deviations (RSD) for three or more replicate samples. Laboratory precision shall be assessed through the analysis of matrix spike/matrix spike duplicate (MS/MSD) and field duplicate samples. The RPD between the MS/MSD is calculated to compare precision DQOs. One MS/MSD sample will be analyzed for every 20 or fewer samples. The precision requirements are specified in the NLS's SOP for each individual SW846 method. The sensitivities required for analyses will be the Method Detection Limits (MDLs) and Limits of Quantitation (LOQ) included in Table 2 of NLS's QA/QC Manual, a copy of which is included in Appendix B. The precision limits for STL's analysis (TO-15) are listed in Appendix C.

4.2.2 Accuracy

Accuracy is the degree of agreement between an observed value and an acceptable reference value. Field accuracy is assessed through the use of field and trip blanks, along with adhering to all sample handling, preservation, and holding times. One volatile organic compound (VOC) trip blank consisting of distilled ultra pure water will be included along with each shipment of aqueous VOC samples.

The accuracy of an analytical method is determined from the analysis of a sample containing a known quantity (spike) of material. Matrix spikes are evaluated by analyzing a normal environmental sample along with a spike of predetermined compounds/parameters in that sample. Surrogate spike analyses will also be conducted on samples analyzed for organic

analysis. The accuracy of the data will be evaluated by determining the percent recovery of matrix and surrogate spike samples, where applicable. In addition, method blanks will be analyzed to ensure that contamination in the laboratory has not introduced a systematic error into the analytical results. The accuracy required for analyses will be the MDLs and LOQs included in Table 2 of NLS's QA/QC Manual, a copy of which is included in Appendix B. The accuracy limits for STL's analysis (TO-15) are listed in Appendix C.

Accuracy of laboratory results will be evaluated for compliance with the criteria established in the laboratory method-specific SOPs using the analytical results, LCS results, and MS/MSD samples. The percent recovery of the LCS and MS samples will be calculated using the following equation:

$$\%R = [(A - B)/C] \times 100$$

where A = The analyte concentration determined experimentally from the spiked sample;
B = The level determined by a separate analysis of the unspiked sample; and
C = The amount of the spike added.

Accuracy of field data will be evaluated through daily instrument calibration, periodic calibration checks, and analysis of reference standards. During field instrument calibration, the absolute value difference or percent difference (%D) from the true values (the reference standard value) will be calculated. The absolute value difference will be calculated as follows:

$$\text{Absolute value difference} = \text{True value} - \text{measured value}$$

The %D will be calculated using the following equation:

$$\%D = (A-B)/A \times 100$$

where A = True value; and
B = Measured value.

4.2.3 Representativeness

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an

environmental condition. Representativeness is a qualitative parameter that is dependent upon the proper design of the sampling program and proper laboratory protocol. The sampling network was designed to provide data representative of site conditions. During development of this network, consideration was given to past waste disposal practices, existing analytical data, physical setting and processes, and constraints inherent to the site. Representativeness will be satisfied by insuring that the QAPP is followed, proper sampling techniques are used, proper analytical procedure are followed, and holding times of the samples are not exceeded in the laboratory. Representativeness will be assessed by the analysis of field duplicate samples.

4.2.4 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected to be obtained under normal conditions. Valid data is defined as data that are considered usable (i.e., non-rejected results) after the validation process. The amount of expected data refers to the number of measurements planned. It is expected that both subcontract laboratories will provide data meeting QC acceptance criteria for 95 percent or more for all samples tested. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{Percent Completeness} = \frac{\text{Number of valid measurements}}{\text{Number of expected measurements}} \times 100$$

Percent completeness is calculated by chemical.

4.2.5 Comparability

Comparability expresses the confidence with which one data set can be compared with another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data, as described in this QAPP, are expected to provide comparable data. These new analytical data, however, may not be directly comparable to existing data because of difference in procedures and QA objectives.

4.3 SPECIAL TRAINING REQUIREMENTS / CERTIFICATIONS

All personnel responsible for performance of field activities or anyone who will be on site within the exclusion zone are required to have completed the 40-hour OSHA HAZWOPER training course and current 8-hour refresher courses.

URS employees and subcontractors who performing work at the Site must have HAZWOPER initial 40-hour training and refresher course documentation. Field Managers must have documentation of 8-hour Site Supervisor training.

4.4 DOCUMENTATION AND RECORDS

The following sections describe the documents and records that will be generated during the project.

4.4.1 Sample Collection Records

Sample collection records document that the proper sampling protocol was performed in the field. These records will include: field logbooks, soil boring logs, daily field reports, COC forms, COC seals, and COC tags. A detailed description of the sample collection records documents is provided in Section 5. A sample COC form and sample labels are included in Appendices B and C for each of the subcontract analytical laboratories.

4.4.2 QC Sample Records

The generation of QC samples such as field and trip blanks, and duplicate samples will be documented in field logbooks and on COC forms. Sample preservation will also be noted on the COC forms. Sample integrity will be noted on the COC form by the analytical laboratory.

4.4.3 Field Analysis Records

Field analysis records will include headspace vapor monitoring of soil samples, boring logs, well construction logs, well development logs, well sampling forms, and COCs. The data generated during field activities will be recorded in field logbooks and forms. The field data will be presented on final forms in the RI/FS report.

4.4.4 Fixed Laboratory Records

Laboratory specific records which will be compiled include COC records, sample receipt forms, preparation and analysis forms/logbooks, tabulated data summary forms and raw data for samples, standards, and QC samples.

4.4.5 Data Handling Records

These records document protocols used in data reduction, verification, and validation. Data reduction, evaluation, and reporting of sample results by the subcontract analytical laboratories will be performed in accordance with the individual quality manuals and project specific attachments included in Appendices B and C.

4.5 DATA REPORTING PACKAGE FORMAT AND DOCUMENT CONTROL

Field documentation of data collection is described in detail in Section 5.2.

Laboratory documentation procedures for NLS and STL are described in each laboratories quality manual. At a minimum, the analytical reports provided by NLS comprise the final results, methods of analysis, levels of reporting, surrogate recovery data (where applicable), and method blank data. Additional documentation will be required to perform data validation. Both laboratories will provide supporting documentation (i.e., CLP-like reports) to perform validation in accordance with CLP guidance. The format of the data will be consistent with the requirements and procedures presented in Sections 5 and 6. The final data report that will be provided by the laboratories will contain the following items:

- Cover Page – signed by the project manager
- Case Narrative
- Calibration summary and raw data
- Sample information
- Results to the reporting limit (RL), with RL for non-detects
- Quality Control
- Quality Assurance Methods Reference and Notes
- Chain of Custody

-
- Raw Data

4.6 DATA REPORTING PACKAGE ARCHIVING AND RETRIEVAL

A central project file has been established at URS' Madison, Wisconsin office. The project file will include originals or copies of all project related paperwork for technical and administrative purposes.

-
- | | |
|--------------------|--------------------|
| ▪ pH | ±0.1 pH units |
| ▪ Temperature | ±0.1 °C |
| ▪ Turbidity | <5 NTUs (Optional) |
| ▪ Dissolved Oxygen | ±0.2 mg/L |

For low permeability formations, purging will continue until the well is dry. If time permits, the well will be allowed to recover completely and be bailed dry a second time. Purge volumes and the color, odor, and turbidity of each will be noted on field sampling forms. The condition of the well will also be recorded at the time of sample collection. The procedures for determining pH, specific conductance, and temperature are detailed in SOPs 110, 120, and 130.

To maintain clean working conditions and control the quality of the samples collected, proper equipment decontamination procedures will be followed during all field activities. For groundwater sampling, dedicated or disposable sampling equipment will be used whenever possible to minimize the potential for cross-contamination. Sampling equipment such as bottom-filling bailers, submersible pumps, and other sampling implements will be decontaminated prior to each sample collection by washing with a low phosphate detergent, rinsing with potable water, followed by rinsing with de-ionized water. Equipment will be air-dried prior to use. Cleaned equipment will be laid out on polyethylene sheeting at each sampling location to avoid potential contamination due to contact with surface soils. Decontamination procedures will be performed in accordance with SOP 190 in Appendix A.

After the wells are purged, groundwater samples will be collected with the dedicated bailer by gently lowering the bailer below the static water level. The bailer will then be removed from the well and the sample will be discharged using a bottom emptying device into pre-cleaned containers provided by the laboratory.

Samples will be submitted to NLS for VOCs will be analyzed by SW846 Method 8260B, SVOCs by Method SW846 8270C, metals by SW846 Method 6010B/7471A, hexavalent chromium by Method 7196A, in accordance to procedures specified in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition* (SW-846), revised April 1998 (USEPA, 1998), and total cyanide by *Standard Methods for the Examination of Water and Wastewater* (18th Edition), Section 4500-CN-B. These sample collection procedures are described in detail SOPs 150 and 160 included in Appendix A. Sample collection, containers,

preservatives, laboratory analysis, and holding times are also discussed in detail below and in the QAM included in Appendix B.

5.2 SURFACE SOIL SAMPLE COLLECTION PROCEDURES

Surface soil samples will be collected using hand tools, clean spatulas, and a scale for weighing samples and containers. At each surficial soil sample location for direct contact conditions, soil will be collected from a depth between 3 and 12 inches utilizing hand tools. Samples will be collected every two feet and screened with a photo-ionization detector (PID) equipped with a 10.6 eV lamp. Field screening results will be used to select soil samples for laboratory analysis. Soil samples for non-volatile organic or inorganic analyses will be placed in 4 ounce, pre-cleaned glass containers (or other “certified-clean” bottles as provided by the laboratory). Soil samples for volatile organic analyses will be collected and field-preserved in accordance with SW846 Method 5035. Proper field sampling documentation, and field analytical and laboratory documentation helps to ensure sample authenticity and data integrity. During drilling operations, if poor recovery (of the soil column) is obtained, the laboratory will analyze samples in the following priority: 1) VOCs; 2) SVOCs; 3) Metals; 4) hexavalent chromium; and 5) total cyanide.

5.3 SUBSURFACE SOIL SAMPLE COLLECTION PROCEDURES

Soil samples will be collected continuously with a GeoprobeTM macro sampler. The subsurface soil sampling equipment is described in SOP 140, Soil Sample Collection from Boreholes, included in Appendix A. GeoprobeTM borings will be advanced a minimum of five feet below the base of the filled ravine, or to a maximum depth of 20 feet in the Upper Bluff/Ravine area, and to the underlying clay layer (Miller Creek formation) or to a maximum depth of 15 feet in the Kreher Park area. Soil samples will be collected and classified for soil type by a geologist or qualified geological engineer. Samples submitted for laboratory analysis will be selected at the rate of one sample every 10 feet of drilling. These soil samples will be analyzed for VOCs, SVOCs, and inorganic compounds listed in Table 1.

Samples will be collected every two feet and screened with a photo-ionization detector (PID) equipped with a 10.6 eV lamp. Field screening results will be used to select soil samples for laboratory analysis. Samples will be placed in laboratory containers with a spatula, held on ice,

and shipped to the laboratory along with a completed chain-of-custody form. Similar to surface soil sample collection procedures, soil samples for non-volatile organic or inorganic analyses will be placed in 4 ounce, pre-cleaned glass containers (or other “certified-clean” bottles as provided by the laboratory). Soil samples for volatile organic analyses will be collected in EnCore™ devices or will be field-preserved in accordance with SW846 Method 5035. Proper field sampling documentation, and field analytical and laboratory documentation helps to ensure sample authenticity and data integrity. During drilling operations, if poor recovery (of the soil column) is obtained, the laboratory will analyze samples in the following priority: 1) VOCs; 2) SVOCs; 3) Metals; 4) hexavalent chromium; and 5) total cyanide.

5.4 SEDIMENT SAMPLE COLLECTION PROCEDURES

Sediment samples will be collected using a Ponar dredge, stainless steel corers, bucket augers, or other standard equipment. The following SOPs describe the procedures for the collection of sediment samples:

- Sediment Sampling for Toxicity Testing and Benthic Community Analysis (SOP 240)
- Sediment Sampling for Chemical and Physical Parameter Testing (SOP 250);
- Ponar Sampling (SOP 280);
- Vibracore Sediment Sampling (SOP 290); and
- Sediment Sampling for Sediment Pore Water Analysis (SOP 300).

These SOPs are included in Appendix A. Sediment samples will be described for the attributes of texture, color, moisture content, grain size, sorting, stains/odors, and inclusions.

5.5 SOIL AND GAS VAPOR INTRUSION SAMPLE COLLECTION PROCEDURES

Soil vapor samples will be collected from seven locations to determine if fugitive VOC emissions are being released from the ravine fill. Two rounds of sampling will be conducted, one during the summer and the second during the winter. Grab samples will be collected from soil vapor probes located at the Site. The sample well identifications and general locations are shown on Figure 4 in the FSP. Sampling equipment needed to collect vapor intrusion samples includes 6 L Summa canisters, Teflon tubing and inline particulate filters. Once collection of the soil vapor sample is complete and the cap is replaced on the canister valve, a canister tag will be

filled out and attached to the canister. The tag will detail the sample ID and other pertinent information. The canister will be shipped to the laboratory in the same packaging as it was shipped. A laboratory chain of custody will be filled out and accompany the samples during shipment. The hold time for TO-15 analysis is 30 days. Procedures for collecting vapor intrusion samples are listed on SOP 200.

Vapor intrusion samples will be collected from one location to determine if fugitive VOC emissions are migrating from the ravine fill to indoor areas. Two rounds of sampling will be conducted, one during the summer and the second during the winter. The sample will be collected inside the southeast garage area of the NSP Energy vehicle storage building. This sample is on the other side of the wall from the MW-15 well nest. The sample location is shown on Figure 4 in the FSP. Procedures for collecting vapor intrusion samples are listed on SOP 200. Sample information will be recorded on the canister sampling collection form. The sample will be collected over a period of 24 hours using a regulator. The regulator is used to provide a time weighted average (TWA) sample by restricting the flow rate of air entering the canister. The valve cap on the Summa canister is removed and the regulator is connected to the valve. A particulate filter is then connected inline to the regulator. The canister valve is then opened and the start time recorded in the field notebook. For the vapor intrusion samples, a sample interval of approximately 24 hours is required. Once 24 hours has passed, the canister valve is closed and the valve cap replaced. The end time will then be recorded in the field logbook. Similar to the soil vapor samples at the end of the collection period, the cap is replaced on the canister valve, a canister tag is filled out and attached to the canister. The tag will detail the sample ID and other pertinent information along with the laboratory chain of custody. Procedures for collecting vapor intrusion samples are listed on SOP 200.

5.6 BIOLOGICAL SAMPLE COLLECTION PROCEDURES

Fish tissue samples will be collected to support the baseline human health and ecological risk assessments. The tissue samples will be collected from three species of fish, smelt and two higher trophic level species (e.g. walleye, smallmouth bass). These fish will be collected from two areas, the Chequamegon Bay Inlet (study area) and a reference area located nearby. Fish tissue sampling will be conducted during the spawning season for smelt and during the normal fishing season for the other two species.

All collection permits should be obtained well in advance of the target sampling period to allow for flexibility in the timing of sampling. Sampling should occur after the collection of sediment quality triad samples to minimize influence of substrate disturbance that may result from fish tissue sampling (e.g., seining).

Sixteen whole fish composite samples of smelt will be collected from the study area; sixteen whole fish composite samples of smelt will be collected at the reference locations. The number of individual smelt included in a composite sample will be based on a minimum aggregate sample of 200 grams; however, the number and size of fish in each composite will be consistent for each sampling. An effort will be made to collect larger individuals of smelt but it is more important that the size of fish in all composites are approximately the same. Sixteen individual fish of the two other higher trophic species will be collected for tissue analysis: fillets from eight individuals will be collected for the HHRA and eight whole body samples will be collected for the BERA from these species. Procedures for collecting fish tissue samples are included in SOP 230.

5.7 MISCELLANEOUS SAMPLE COLLECTION PROCEDURES

Miscellaneous samples include samples that will be collected from test pits and wastewater treatment systems. Soil samples will be collected from the bottom of the test pits using hand tools, and clean spatulas. A backhoe may also be used to excavate soils or other overburden to reach natural soil to be sampled. The backhoe bucket will be decontaminated according to the procedures in Appendix A prior to the start of the excavation. If samples are collected from the bucket, they will be collected from the middle of the bucket (i.e., away from the sides of the bucket to avoid the potential for cross-contaminated soil, if present, that would reside near the sides. Sample aliquots will be obtained using a decontaminated stainless steel trowel, equivalent stainless steel sampling tool, or split spoon. New disposable gloves will be worn and changed frequently. When obtaining an aliquot, care should be taken to avoid inclusion of any obvious foreign materials. Grab samples are transferred directly into sample containers. The sampling equipment will be decontaminated between samples.

5.8 DOCUMENTATION OF FIELD ACTIVITIES

Data collected during the field activities will be recorded in field logbooks by the Field Manager(s). Entries will be described in as much detail as possible so that events can be

reconstructed without reliance on memory. All entries in the notebook will be made with ink. Entries into the logbook will contain a variety of information regarding field activities at the Site. Each daily entry will begin with the following information:

- Date
- Log open time
- Title
- Purpose and description of field activities
- Weather
- Field personnel
- Equipment used

The sampling representative will date and sign each activity on the day completed. Corrections will be made by drawing a single line through the incorrect entry, entering the correct information, and initializing and dating the change. At the end of each day, the sampler or Field Manager will sign and enter the time after the last entry is made (log closed time).

All measurements made, photographs taken, and samples collected will be entered into the notebook. The notebook will contain a sufficient amount of information to distinguish each sample, photograph, or measurements from the others. That information will include:

- Project name
- Unique, sequential field sample number
- Matrix sampled (groundwater, soil, sediment, etc.)
- Sample depth
- Sampling date and time
- Specific sample location in sufficient detail to allow re-sampling at the same location
- Sampling methods and/or reasons for modifications to standard operating procedures
- Preservation techniques, including filtration, as appropriate to sample type
- Analysis to be performed
- Significant observations made during the sampling process
- Results of any field measurements
- Photograph number, roll number, and photograph description

-
- Printed name and signature of persons performing the sampling
 - Date and time of shipment, number of shipping containers, samples sent, and carrier.

5.9 SAMPLE HANDLING

Proper field sampling documentation, and field analytical and laboratory documentation helps to ensure sample authenticity and data integrity. For soil and groundwater samples selected for laboratory analysis, the following order of analytical parameter sample fraction collection will be utilized: 1) VOCs; 2) SVOCs; 3) Metals; and 4) Cyanide.

The sample numbering system for field sample collection will utilize a two-letter project identification code followed by a sample code and a location code. The project location code will be NS (for NSP). The matrix code, or sample type code will be an alpha code corresponding to the sample type as follows:

AA	Ambient Air (indoor air samples (2 round)
AQ	Air Quality Control Matrix (background air sample (2 rounds)
DC	Drill Cuttings (soil cuttings for disposal)
GE	Gaseous Effluent (Stack Gas) (effluent air sample (monthly)
GS	Soil G (soil gas from vapor probes (2 rounds)
LF	Free-Phase Product (Free-phase coal tar)
SE	Sediment
SO	Soil (surface and subsurface soil samples)
SQ	Soil/Solid Quality Control Matrix/Duplicate soil samples
TA	Animal Tissue
TQ	Tissue Quality Control Matrix/Duplicate tissue samples
WG	Ground Water (from monitoring wells)
WP	Drinking Water (from artesian wells)
WW	Waste Water (influent/effluent samples from remediation systems)
WQ	Water Quality Control Matrix (duplicate, field blank, and trip blanks)

The location code will follow the sample type code and will consist of a two to five-digit numeric or alpha-numeric code that indicates the sample location. Location codes lower than 10 will be preceded by a '0' (e.g. 01, 02, etc.). Geoprobe soil samples, surface soil samples, field blanks, and trip blanks will use a consecutive numbering system starting at 01. For subsurface soil samples, the location code will be followed by the depth of the sample. For groundwater samples, the location code will be the monitoring well number, plus a four-digit character

representing the month and year (e.g., 0404 for April 2004). The four-digit character will also apply to soil vapor and soil intrusion samples. Examples of sample identification numbers would be:

- NS-WG-MW-10-0205, for Site, groundwater sample from monitoring well MW-10 during the first quarter (February) of 2005
- NS-SO-GP104 2-4 ft, for Site, subsurface soil sample from Geoprobe Boring 104 at a depth of 2-4 feet below ground surface (bgs)
- NS-SO-SS-04, for Site, surface soils from location 4.
- NS-SQ-FD-MW-15A, for Site, field duplicate groundwater sample from monitoring well MW-15A
- NS-WQ-TB-01-Mar04 for trip blank sample 1 collected in March 2004
- NS-SQ-MS-MW-15A, for Site, matrix spike groundwater sample from monitoring well MW-15A
- NS-SQ-MSD-MW-15A, for Site, matrix spike duplicate groundwater sample from monitoring well MW-15A
- NS-SQ-FD-SS-01 for Site, field duplicate surface soil sample collected at SS-1
- NS-GS-VP1-0505, for Site, soil gas samples collected at vapor point one during the month of May 2005.

Sample handling and custody are described in detail in Section 5.6.

5.10 CALIBRATION PROCEDURES, EQUIPMENT, CONTAINERS AND SUPPLIES

5.10.1 Laboratory Instrument Calibration Procedures

For the Ashland Lakefront Project, NLS and STL will use calibration procedures and frequency specified in the attached supporting documentation included in Appendices B and C. Along with proper maintenance, these procedures ensure optimum instrument performance and accuracy. These procedures include proper operator training and supervision; mandatory instrument performance specifications; and systematic instrument calibration, verification, and monitoring schedules. Calibration criteria will be met before sample analysis is initiated.

5.10.2 Field Instrument / Equipment Calibration Procedures

Prior to the start of field activities, field equipment will be calibrated to ensure that it is operating correctly. Calibration refers to the checking of physical measurements of instruments against accepted standards. It also refers to determining the response function, which is the measured net signal as a function of the given chemical concentration for an analytical instrument. Both these determinations have a significant impact on data quality and will be performed on a regular basis.

Calibration policies and procedures are discussed in the individual SOPs developed for each instrument. The following SOPs are included in Appendix A:

- Water Level Meters (SOP 100).
- pH meter (SOP 110);
- Specific Conductance Meter (SOP 120); and
- Thermometer (SOP 130).

The pH meter will be calibrated with two different buffer solutions which bracket the historical range of pH in the well to be sampled. The meter will be calibrated in accordance with the manufacturer's specifications and SOP 110. The probe of the meter and sampling cups will be thoroughly rinsed with de-ionized water before and after use. The pH meter calibration will be checked at each well. If the meter exhibits unacceptable error (> 0.1 pH unit), it will be re-calibrated.

The specific conductance meter will be calibrated in accordance with the manufacturer's specifications and SOP 120. The specific conductance meter will be calibrated prior to use. If the meter exhibits unacceptable error ($>3\%$), it will be re-calibrated. The probe of the meter and sampling cups will be thoroughly rinsed with de-ionized water before and after use.

Calibration intervals and procedures for field instruments will be those recommended by the instrument manufacturer, unless experience indicates a shorter interval is required. When the manufacturer has not specified a calibration interval for an instrument, it will be established by the consultant. Calibration intervals for the field equipment are summarized below.

FIELD INSTRUMENT CALIBRATION AND MAINTENANCE SCHEDULE

Instrument	Scheduled Calibration
Conductivity meter	Daily
pH meter	Daily
Water level tape(s): steel, fiberglass, or electric tape	Calibrated against National Bureau of Standards Traceable Instrumentation
Thermometer	Calibrated against National Bureau of Standards Traceable Instrumentation

5.10.3 Equipment, Supplies and Containers

The following equipment, containers, and supplies may be utilized at the Site during the field activities:

EQUIPMENT

Groundwater Sampling Equipment

- Disposable PVC bailers as required
- Submersible pumps
- Bailer bottom emptying device
- Specific Conductance and pH meters
- Thermometer
- Water level indicator

Soil Sampling Equipment

- Scale
- Spatula

Miscellaneous Equipment and Supplies

- Decontamination supplies
- Bailer wire/rope
- Container labels
- Permanent markers/field books and forms
- Ice chests
- Preservatives/pH indicator paper
- Well Keys
- Safety supplies

SAMPLE CONTAINERS

Sample containers for all soil and groundwater samples for this project will be supplied by NLS. Summa canisters for air samples will be supplied by STL. NLS purchases pre-cleaned, certified sample containers, which are provided to URS. STL cleans used canisters in accordance with procedures outlined in the laboratory's SOP included in Appendix C. Sample containers used for the collection of all aqueous samples for this project will include the following:

- 40-mL glass vials preserved with HCL for VOC analysis
- 1-L amber glass jars (unpreserved) for SVOC analysis
- 500-mL plastic bottles preserved with HNO₃ for metals analysis

Sample containers used for the collection of all soil samples for this project will include the following:

- 60-mL amber glass jars preserved with methanol for VOC analysis;
(alternately, EnCore devices in accordance with SW846 Method 5035)
- 60-mL amber glass jars (unpreserved) for SVOC analysis; and
- 60-mL plastic bottles (unpreserved) for percent solids and metals analysis

Table 7 presents the sample container, preservation and holding time requirements for each sample matrix and analysis.

5.11 INSTRUMENT / EQUIPMENT INSPECTIONS AND MAINTENANCE

Instrument/equipment maintenance logs will be kept and equipment will be checked prior to use to ensure it is functioning properly.

5.11.1 Field Instrument Inspections and Maintenance

The field preventative maintenance procedures and frequencies of checks are detailed in Table 11 of this QAPP. Critical spare parts include spare batteries and back-up instruments. Instruments will be maintained according to manufacturer's specifications. More frequent maintenance may be required depending on the operational performance of the instrument. Instrument maintenance logs will document the date and type of maintenance performed on a specific piece of equipment.

5.11.2 Equipment Inspections and Maintenance

A routine preventative maintenance program is conducted by both laboratories to minimize the occurrence of instrument failure and other system malfunctions. Scheduled maintenance is performed on all analytical equipment. Maintenance procedures for individual instruments are performed according to instructions in the operation manual for that instrument. Conductivity, pH, and specific ion electrodes are rinsed with reagent grade water after each use. Probes are also cleaned according to cleaning procedures in operation manuals. Analytical balances are cleaned frequently and are serviced and calibrated annually by E&B Scale. Balances are checked with class S weights when they are used.

Preventative maintenance that cannot be performed by laboratory staff is contracted to the manufacturer's service section or to an authorized maintenance vendor. Examples of maintenance procedures and frequencies for major analytical instrumentation are summarized in Table 12.

5.12 CHAIN OF CUSTODY PROCEDURES

5.12.1 Sample Custody Overview

Sample custody will be regulated and maintained through chain of custody procedures. Chain of custody is the means by which the possession and handling of samples are traced from the field to the laboratory. A sample is considered to be in a person's custody if it is actually in the person's possession, it is in the person's view, or it was in the person's possession and was secured by that person in a locked location.

The field sampling representative will be personally responsible for the care and custody of samples collected until they are transferred or dispatched properly. The Project Coordinator/QA Manager will determine whether proper custody procedures were followed during the field work, and will decide if additional samples are required. Prior to commencement of sampling, the Project Coordinator/QA Manager will instruct the sampling team in the chain-of-custody procedures.

Samples will be accompanied by a chain-of-custody record at all times. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. The record will document sample custody transfer from the sampler, often through another person, to the sample custodian and analyst at the laboratory. The minimum information recorded on the chain-of-custody record, in addition to the signatures and dates of all custodians, will include:

- Project identification;
- Sampling date and time;
- Identification of sample collector;
- Sample identification;
- Sample description (type and quantity); and
- Analyses to be performed.

5.12.2 Sample Custody in the Field

Field personnel will be responsible for the custody of the samples from the time they are collected until they are transferred to the sample carrier for shipment. Personnel handling the samples will be kept to a minimum to minimize transfers.

Each sample collected will be identified with a unique sample number. Sample identification information will be printed on a self-sticking sample container label affixed to the container. The sample label will contain the sample ID number, date collected, time of collection, site name, sample location (i.e., well number), sample date, parameter group, preservatives, and other pertinent information. Labels will be completed using indelible ink. After labels are filled out completely, labels will be covered with clear tape. The sample number, location, media type, observations, preservatives, and other sampling information will be recorded in the field book or on the appropriate sampling form.

Samples will be placed in a thermal chest on ice immediately after sample collection. The chest will remain in the sampler's view or will be locked in a secure location at all times prior to transport to a laboratory. Prior to laboratory transfer, samplers will prepare and package samples in accordance with the following procedures:

- Fill out chain of custody form completely and accurately
- Check each of the sample bottle caps to ensure that each cap is secure
- Rinse the outside of the sample bottles using de-ionized water to remove residual dirt, if necessary
- Place each sample container in a sealable zip-lock bag of appropriate size and secure with strapping tape
- Place sample bottles in the cooler in an upright position
- Ensure that glass sample containers do not touch
- Place inert packaging materials under, around, and above sample bottles to ensure that the containers are not broken during shipment
- Completely cover sample bottles with ice to ensure samples are preserved at the proper temperature (4°C) upon arrival at the laboratory

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- Put paper work (chain of custody) in a sealable plastic bag and tape it inside the lid of the cooler
 - Obtain copies of the chain of custody for project file prior to securing lid
 - Secure lid by taping with strapping tape
 - Wrap cooler completely with strapping tape in at least two places (do not cover labels)
 - Attach completed shipping label to top of cooler, and place "This side up" and "Fragile" labels on cooler

Samples will be packaged properly for shipment and dispatched to the laboratory. A separate chain-of-custody record will accompany each cooler. Shipping containers will be sealed for shipment to the laboratory. The method of shipment, courier name(s) and other pertinent information will be entered in the "remarks" box. The last copy of the form will be removed and retained. The original and remaining copies will be placed inside a plastic zip-lock bag taped to or placed at the top of the container. After the container is closed, the container will be sealed by wrapping it with a minimum of two complete wraps of strapping tape. The samples will be shipped by overnight carrier or picked up by the laboratory daily, or as often as necessary to ensure that samples meet holding times. The sample shipping receipt will be retained as part of the permanent chain of custody documentation.

5.12.3 Laboratory Chain of Custody Procedures

The laboratory sample custodian will receive and document all sample submittals into the laboratory. The sample custodian will immediately inspect the condition, preservation, temperature, and accompanying documentation of all submitted samples prior to approval and formal acceptance into the laboratory. Any problems will be immediately reported to the laboratory Project Manager. Any sample preservation or documentation discrepancies (e.g broken sample containers, improper preservation, inadequate sample volume, poor documentation, etc.) will be resolved before the sample is approved and actually accepted for analysis. The laboratory custodian will then complete all appropriate lab tracking sheets and logs, and sign and date the chain-of-custody.

5.12.4 Project File Custody Procedures

Project files originating in the laboratory will be maintained in secure areas according to the following schedule:

- Investigative report package 5 years
- Laboratory generated records 5 years
- Electronically stored data 1 year.

5.13 COLLECTION OF QUALITY CONTROL SAMPLES

It is important to have an adequate number of field and trip blanks, duplicate, and MS/MSD samples to meet quality control requirements. The specific types of quality control samples for the soil and groundwater sampling program are described as follows:

Field Blanks

A field blank, or equipment blank, is a sample of reagent-grade water which is processed through the sampling equipment in the same manner as the actual sample to determine if field cleaning procedures are adequate. Because one dedicated bailer per well will be used, no field blanks will be collected.

Trip Blanks

Trip blanks are provided by the laboratory and sent along with each sampling kit to the Site. These samples generally consist of a set of VOC vials which have been prepared with reagent-grade water at the laboratory. Trip blanks are kept on-site with the sample bottles throughout the sampling program, are never opened, and are submitted to the laboratory with the other samples. The purpose of the trip blank is to determine if any of the sample bottles or collected samples have been contaminated before or during sampling or shipping. One trip blank will be submitted with each cooler containing groundwater samples for VOC analysis that is shipped to the laboratory. Trip blanks are submitted for analysis of VOC's only.

Field Duplicates

A field duplicate is a sample taken to determine variability in the sampling procedure. Field duplicates are generally collected for any type of water quality parameters but can also be collected for soil media.

Duplicates are collected by splitting the sample between two sets of containers at the time of sample collection. This is done by filling a portion of each sample bottle alternating from one to the other until both are filled. This type of sampling attempts to provide a "duplicate sample" for analysis which provides additional data for comparative purposes.

A sample batch is considered to be any single group of samples that is sent to the analytical laboratory. Each duplicate sample will be collected for the suite of analyses originally designated for the sample that is split.

Matrix Spike/Matrix Spike Duplicate

Matrix spikes will be used to evaluate the effect of the sample matrix on the preparation and measurement methodology. One MS per twenty samples will be performed for both organic and inorganic analyses. Soil MS/MSD samples require extra volume for VOCs. A minimum of three additional soil core devices is required for each MS and MSD sample. Twice the volume is required for aqueous MS/MSD samples. One MSD sample will be collected for every twenty or fewer investigative sample for organic analysis per sample matrix.

5.14 LABORATORY ANALYSIS

All soil and groundwater² samples will be analyzed for metals, VOCs, SVOCs, and total cyanide. Metals will be performed by Method 6010/7470/7471, VOCs will be performed by Method 8260B, SVOCs by Method 8270C in accordance to procedures specified in SW-846. Total cyanide will be performed by *Standard Methods for the Examination of Water and Wastewater* (18th Edition), Section 4500-CN-B. VOCs include the following:

Benzene
sec-Butylbenzene
Ethylbenzene
Styrene
Toluene
1,2,4-Trimethylbenzene
1,2,3-Trimethylbenzene
1,3,5-Trimethylbenzene
Total Xylenes

Semi-volatile organic compounds include the following:

Acenaphthene	Fluorene
Acenaphthylene	Indeno(1,2,3-c,d)Pyrene
Anthracene	1-Methylnaphthalene
Benzo(a)Anthracene	2-Methylnaphthalene
Benzo(a)Pyrene	Naphthalene
Benzo(e)Pyrene	Phenanthrene
Benzo(b)Fluoranthene	Pyrene
Benzo(k)Fluoranthene	Dibenzofuran
Benzo (ghi)Perylene	Phenol
Chrysene	2-Methyl Phenol
Dibenzo(a,h) Anthracene	3-Methyl Phenol
Fluoranthene	4-Methyl Phenol

² Although drinking water from 2 artesian wells will be sampled, the testing laboratory will use SW846 analytical methods for the analysis of these groundwater samples rather than test methods developed for drinking water analyses under 40 CFR Part 141.

Inorganic compounds include the following:

Arsenic	Lead
Aluminum	Magnesium
Antimony	Manganese
Barium	Mercury
Beryllium	Nickel
Cadmium	Potassium
Calcium	Selenium
Chromium (+3)	Silver
Chromium (+6)	Sodium
Cobalt	Thallium
Copper	Vanadium
Cyanide	Zinc
Iron	

Soils vapor chemicals include the following (by TO-15 analysis):

1,1,1-Trichloroethane	Chloromethane
1,1,2,2-Tetrachloroethane	cis-1,3-Dichloropropene
1,1,2-Trichloroethane	Dichlorodifluoromethane
1,1-Dichloroethane	Ethylbenzene
1,1-Dichloroethene	Hexachlorobutadiene
1,2-dichlorodifluoromethane	Methylene chloride
1,2-Dibromoethane (EDB)	Styrene
1,2-Dichlorobenzene	Tetrachloroethene
1,2-Dichloroethane	Toluene
1,2-Dichloropropane	cis-1,2-Dichloroethene
1,2,4-Trichlorobenzene	trans-1,3-Dichloropropene
1,2,4-Trimethylbenzene	Trichloroethene
1,3-Dichlorobenzene	Trichlorofluoromethane
1,3,5-Trimethylbenzene	Vinyl chloride
1,4-Dichlorobenzene	m-, o-, p-Xylenes (total)
1,2,3-Trimethylbenzene	
Benzene	
Benzyl chloride	
Bromomethane	
Carbon tetrachloride	
Chlorobenzene	
Chloroethane	
Chloroform	

All soil and groundwater samples will be submitted to NLS for analysis. Air samples will be submitted to STL for analysis. Samples for sediment testing will be submitted to a subcontract laboratory designated by future amendment to this QAPP. Procedures described in the NLS QA/QC Manual and project specific attachments will be followed for the completion of this project. These procedures include: analytical procedures; calibration procedures and frequencies; preventative maintenance; and, quality control checks and routines to assess precision, accuracy, and method detection limits.

6.0 DATA ASSESSMENT AND OVERSIGHT

Assessments will be performed periodically throughout the project to ensure that usable data will be generated. Internal audits may be conducted by the QA officers from URS and the contract laboratory.

6.1 FIELD SAMPLING TECHNICAL SYSTEM AUDIT (TSA)

The URS Field Team Leader will conduct an audit of field activities, covering both sampling and measurements. The audit will be performed at the start of field sampling activities and on the first day of any subsequent mobilizations so that effective corrective action measures can be implemented prior to field work being completed to mitigate any identified non-conformances. The audit will examine sample collection equipment, instrumentation including calibration procedures, availability of supplies and backup equipment, sampling procedures, COC and sample tracking, and field log books.

6.2 DATA PACKAGE TSA

The data package TSA is a limited review of the complete data package deliverable generated by the laboratory to ensure that all required deliverables are provided and contain all information required. The review of the completeness of the data package will assess if all items specified in the QAPP are present. All summary tables and figures will be checked for errors with the original data reports prior to including them in final reports.

6.3 FINDINGS AND CORRECTIVE ACTION RESPONSES

Deviations and project deficiencies that are identified will be addressed in an issue specific manner. The corrective action responses will be implemented at the time the problem is identified. The first level of notification will be to alert the URS Project Manager, with subsequent notification of the USEPA and WDNR Project Managers. Implementation of corrective actions will be confirmed via project memorandum to all Project Managers, and will be documented in the field logbook, as appropriate.

7.0 DATA VERIFICATION AND VALIDATION

Assessments will be performed periodically throughout the project to ensure that usable data will be generated. Internal audits may be conducted by the QA officers from URS and the contract laboratory.

7.1 DATA REDUCTION, REPORTING AND VALIDATION

7.1.1 Data Reduction

Raw data from field measurements and sample collection activities will be appropriately recorded in the field notebook. If the data are to be used in the project reports, they will be reduced and summarized and the method of reduction will be documented in the report.

Data reduction, evaluation, and reporting of sample results by the laboratories will be performed in accordance with their respective quality manuals and project specific attachments included in Appendices B and C.

7.1.2 Data Reporting

The laboratory will prepare and submit complete reports to the URS Project Manager to include the following:

1. Case Narrative - provides a statement as to the quality of the data and a summary of analytical anomalies.
2. Sample Cross-Reference - includes the client identification number (or field identification number), internal laboratory identification number, and matrix.
3. Analytical results – the results of all analyses re-extracts, reanalyses and dilutions.
4. Supporting documentation – depending upon the deliverable required, one or more of the following shall be provided: bench sheets, mass spectra, gas chromatograms, ICP or AA instrument printouts.
5. Calibration – summary forms, instrument outputs, and quantitation reports for initial and continuing.
6. General QC data – method blanks, MS/MSD recoveries, and surrogate recoveries.

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7. Instrument detection limits.
 8. Sample preparation – extraction sheets, digestion sheets, logbook pages, etc.
 9. Method-Required QC data – tuning, interelement correction data, instrument blank outputs and quantitation reports.
 10. Sample handling – chain-of-custody forms, correspondence, sample log-in and receipt forms.

There may be a maximum turnaround time of 30 calendar days from the date the sample is received at the laboratory to the date the analytical reports is delivered to URS.

Analytical results will be reported as follows:

1. Detected organic results below the Laboratory Reporting Limit (i.e., estimated quantitation limit), but greater than the method detection limit, will be reported as that value with a qualifier to indicate that the value is estimated (“J”). Also, detected organics found in the laboratory blank will also be reported.
2. Non-detected organic results will be reported at the reporting limit value with a qualifier to indicate that the compound was undetected (“U”).
3. Detected inorganic results below the reporting limit, but greater than the method detection limit will be reported as the value with a qualifier to indicate that the value is estimated (“B”).
4. Non-detected metals will be reported at the reporting limit with a qualifier to indicate that the compound was undetected (“U”).
5. One copy of the data package will be submitted for inclusion in the final evidence files. The laboratory will also generate electronic deliverables of the data in ASCII format.
6. Reporting units will conform to those stipulated by the analytical methods.
7. The results of solid samples will be reported on a dry-weight basis, with percent moisture also presented.
8. The results will be reported with dilution correction.

The results of Tentatively Identified Compounds will be reported, as directed for each site-specific investigation.

All data generated will be tabulated in a format organized to facilitate data review and evaluation.

7.1.3 Data Usability

Data usability assessment is the process of evaluating verified/validated data to determine if they can be used to make an environmental decision. Data usability includes the following sequence of evaluation:

- Individual data sets are evaluated to identify the measurement performance/usability issues or problems affecting the ultimate achievement of DQOs;
- An overall evaluation of all data generated for the project is performed;
- Finally, the project-specific measurement performance criteria and data verification/validation criteria documented in the QAPP are evaluated to determine if they were appropriate for meeting project DQOs.

To facilitate the data usability assessment, the reported data will be supported by complete data packages which will include sample receipt and tracking information, COC records tabulated data summary forms, and raw analytical data for all field samples, standards, QC checks and QC samples, and all other project specific documents that have been generated.

7.1.4 Data Validation

Upon receipt of data from the laboratory, all laboratory data collected during the RI will be validated to ensure that the data are accurate and defensible. The data results will be reviewed against validation criteria. A Data Validation Report will be developed for submittal to USEPA after all data has been validated.

All sampling, handling, and field analytical data will be validated by URS. The validation procedure will specify the validation process of every QC measure used in the field and laboratory. All data packages will be reviewed for compliance with the applicable analytical method for the quality of the data reported.

Data validation of the assembled data packages will be done in accordance with CLP guidance as specified in Section 1.1 Compliance of the data against the laboratory SOPs, EPA reference method and data validation criteria will be done for the data packages as specified by URS.

URS will perform a general review of all analytical results to assess data quality. On 10% of the analytical results, URS will perform data validation of the documentation deliverables. A general review includes an assessment of sample handling protocols, supporting laboratory quality control parameters, and field QC. The following is a list of specific analytical information evaluated during a general review:

- Analytical methods performed and test method references
- Sample Condition - review of log-in records for cooler temperature, presence of headspace, chemical preservation, etc.
- Holding times (comparison of collection, preparation, and analysis dates)
- Analytical results (units, values, significant figures, reporting limits, including any matrix interference problems, analyst, percent moisture)
- Sample tractability
- Method blank results and laboratory contamination
- Laboratory control sample (LCS) results and comparison to laboratory control limits
- Matrix spike/matrix spike duplicate (MS/MSD) results and comparison to laboratory control limits
- Field replicate/duplicate results and comparison to data review criteria
- Surrogate recoveries (where applicable) and comparison to laboratory control limits
- Internal standard values (where applicable) and comparison to laboratory control limits
- Electronic Data Deliverables (EDDs) – comparison to the hardcopy analytical report

On a subset of the data (10%), URS will confirm compliance with the reference test methods, and reconstruct the analytical data to verify that data are easily traceable and reproducible. The following is a list of specific analytical information evaluated during a data validation:

- All items under “general review” listed above plus
- Instrument calibrations (initial and continuing)
- Chromatograms (form, structure, baseline)
- Quantitation reports (calculations)
- Mass spectra
- Internal standards
- Retention times

-
- Run logs/sequence logs
 - Preparation/extraction logs
 - Interference check samples (inorganics only)
 - Instrument detection limits (inorganics only)
 - Serial dilutions (inorganics only)

The analytical report will be reviewed for completeness and the accompanying QC data will be assessed for acceptable performance. In case documentation is incomplete, the laboratory would be required to provide the missing information. When QC results indicate inadequate performance, URS will apply data qualifiers to the results to inform the data user of the possible performance problem. These qualifiers are in addition to the qualifiers provided by the laboratory.

For the EDD evaluation, URS will perform a 25 to 50% check of the data to confirm that the results in the hardcopy report matched the results in the electronic file. Data qualifiers will be added to the database, or laboratory qualifiers will be revised, depending upon the outcome of the data validation. No hardcopy analytical reports will be revised. Only the data and qualifiers shown in the electronic database will be changed (as required) to identify data quality issues. A printout of the electronic database information, showing post-validation qualifiers and data revisions, will be attached to the data assessment (validation) reports.

7.2 DATA MANAGEMENT PLAN

A Data Management Plan (DMP) provides the policies and procedures regarding data documentation, control, storage, and management of data. The DMP for the RI/FS at NSP is included as Appendix A of the Project Management Plan.

Inn general, for the NSP/Ashland Lakefront project, data will be generated from environmental sampling and laboratory analysis activities. Sampling activities will be documented by recording details of completed activities in field log books, on field data record forms (soil boring logs, well construction forms, well development forms, well/borehole abandonment forms, and groundwater monitoring forms), and on sample chain-of-custody records. Procedures are documented in detail in section 5.2 of this report. Laboratory activities will be documented as

described in the laboratories quality manuals and project specific attachments included in Appendices B and C.

Data control is a systematic procedure for ensuring that all sampling/monitoring documents are identified and accounted for during and after the project. Document control procedures will include document inventory and storage. This will be accomplished by placing all original copies of data documentation in a project job file to be held in file cabinets for the duration of the project. Project documentation will include three general categories of information:

1. Category 1 data includes general administrative documents, such as project memos, meeting notes and records of telephone and other conversations.
2. Category 2 data includes technical documentation which is not directly associated with sampling, and laboratory analyses, such as field logbooks, field memos, computation forms, project deliverables, and miscellaneous communications; and,
3. Category 3 data includes technical documentation which is directly associated with sampling, and laboratory analyses, such as survey documentation, field data records, chain-of-custody records, laboratory analytical results, and QA/QC data.

All documents will be managed by the Project Manager. Access to original data will be limited to URS staff working on the project. When access to documents is required by others, copies will be provided, and the copies will be clearly stamped "COPY".

7.3 MANAGEMENT OF LABORATORY DATA

Data management of laboratory data involves the handling of information associated with sample collection, analytical reporting, data review, and final data presentation and reporting. The goal of laboratory data management is to produce a series of validated databases for samples collected during sampling the RI/FS. The databases are used to compile, report, and document the results for the site characterizations conducted at the Site. The data management specifications describe the data processing standards, and electronic data pre-loading, loading, and reporting practices. These specifications, when followed, will minimize errors in the compilation of data into an accurate and reliable database. The primary purpose of this section is to communicate to users

and decision-makers how information from the investigation will be handled in the field and office.

For laboratory data deliverables, once validated, all electronic data will be compiled in an electronic MS Access database. This database is one developed by NewFields that serves as a total environmental data management package. It will form the foundation of the site geographical information system (GIS). The database package, called Environmental Data Management System (EDMS), is a comprehensive management tool designed for compilation of historical and ongoing environmental investigations. Computerized data records will be archived to secondary backup computer media (i.e. compact discs) to ensure the integrity of the data in the event of failure of the primary computer storage media.

7.3.1 Electronic Data Deliverables

In general, the laboratory will provide sample receipt confirmations to the Project Manager either by facsimile or by web-site chronicle. This confirmation will include a copy of the tabular listing showing the samples entered into the laboratory's data management system by Sample Delivery Group (SDG) number, the corresponding laboratory identification, and the analyses requested for each sample. The laboratory will provide only a tabular listing of the samples received if only a single analysis is requested for each sample. This daily communication between the laboratory and URS Project Manager will help reduce transcription errors during sample log-in due to hand-written COCs.

During the data validation process, the QA Manager is then responsible for checking the confirmation received from the laboratory versus the COC form (received from the Field Manager) to determine whether:

- All samples were received in good condition
- All samples and analyses were correctly entered into LIMS
- Unique field identification and laboratory identification were assigned to each sample
- All required samples/analyses were collected and analyzed as specified in the GMP

The QA Manager will notify both the Laboratory Project Manager (by phone and/or by fax) of any discrepancies observed during the sample confirmation check. When the sample receipt

information provided to the Field Manager is determined to be correct, the QA Manager will retain a copy of the sample receipt confirmation sheet in the final evidence file for the project.

The laboratory will provide the EDD to URS by email or by diskette. This file will contain only final data. The EDD file will contain the samples and analytical methods associated with one sample data package assigned a SDG number by the laboratory. The file will be tracked by SDG numbers and must be encrypted. The EDD file will be sent to the following two individuals:

Data Manager – Derek Zoellner	zoellner@newfields.com
QA Manager - Susanne Tomajko	susanne_tomajko@urscorp.com

The Data Manager will label the incoming data file as "original." The original EDD file will not be changed revised or otherwise corrected. Changes or revisions to the EDD will be made to a replicate copy of the original EDD. If the EDD file submitted to URS was incorrect or contained data errors, URS may request a new EDD file to be provided. The laboratory will label the new file as the same SDG number followed by the words "revised." All analytical data should be submitted in a delimited text file (*.txt).

At a minimum, the information should be accurate with regard to the following:

- All fields must be reported identically for all data packages. Fields typically reported inconsistently and details that require specific attention include the following:
- Chemical or element name
- Reported order of the chemicals or elements
- Units of measure
- Number of significant figures
- Upper and lower cases
- Leading or trailing spaces in fields, all fields are to be left justified
- Substitution of the letters and numbers, e.g. the letter "O" for the number "0"
- The concentration field (Conc) must be reported in character format. Entries for non-detects must be consistent with the detection limit (Limit1) field entry.
- Environmental samples must be distinguishable from laboratory quality control samples.
- Surrogate compounds must be identified.
- Source of Information

7.3.2 Electronic Data Handling and Validation Qualifiers

The Data Manager will scan electronically submitted files for viruses using the network anti-virus program. It is the responsibility of the Office Local Area Network (LAN) Administrator to keep the anti-virus programs current. If viruses are detected, they must be eradicated before the database is used. The Laboratory Project Manager, QA Manager, and Laboratory Project Manager should be notified of the virus.

After virus scanning, the files contained in the EDD are copied to the LAN. Under no circumstances should changes be made to the original laboratory EDD. Incoming EDD files are processed by the QC database. The main purpose of this database is to translate the EDD format into a format suitable for loading into the reporting database. This intermediate step is required so sample identifications can be associated with physical locations that are constant across all sampling events. This location data is not contained in the EDD file and has to be retrieved from the sampling database.

During the pre-loading step, inconsistencies and errors in the data are sought out and corrected to verify a smooth data load. The Data Manager will evaluate the accuracy of the following prior to data loading:

- Field sample identification numbers
- Duplicate project samples and corresponding field sample identification
- Re-extraction data
- Spelling of synonymous parameter names
- Sample collection date

The Data Manager will be supported by the QA Manager to assess the accuracy of the information in the incoming EDD file. A summary table regarding the corrections made during pre-loading is to be completed by the Data Manager and retained in the final evidence file. The narrative will contain a log of the results of all the QA/QC tests performed.

After completion of pre-loading activities, the sample results will be loaded into the reporting database. The Data Manager will review the loaded file to ensure that the result of the load was accurate. The reporting database has its own set of reports to check chemical counts, results, etc. The Data Manager will provide a copy (printout) of the original EDD file to the QA Manager for use during the data validation process. The printout shall contain the field identification, the

laboratory identification, the parameter, results, units of measure, the laboratory qualifiers, dilutions, and laboratory reporting limits. The Data Manager shall label the copy with the SDG number, the laboratory name, the project name, the date, and the edition (e.g., “preliminary” versus “final”). Upon completion of the data validation task, and peer review, the QA Manager will provide the validation qualifiers to the Data Manager using the original printout. The Data Manager is responsible for entering the data validation qualifiers and reasons into the electronic database using this copy. Once data qualifiers are entered, the Data Manager will then print a revised copy of the database and gives this to the QA Manager who will perform a quality check on the document. The Data Manager will also forward the original (marked up) copy of the data to the QA Manager who will retain the document in the final evidence file for the project. The QA Manager will maintain a summary table of the SDGs received by the laboratory and the status of the validations.

7.3.3 Reporting of Validated Data Handling and Validation Qualifiers

Reports from the database may take on any form requested by the project team. The Data Manager will design a custom report as directed by the Project Manager. The Data Manager will be responsible for directing other project team members in accessing the data.

To make efficient use of the database to support decisions, it is important for the end user to know the status (i.e., preliminary or final) and quality (i.e., non-validated, validated) of the data in the database. This is of primary importance if non-validated data have been entered into the database and distributed to project personnel. Therefore, every database report generated will indicate the current status and quality of the database. The end user must be aware of the caveats accompanying these levels

TABLES

Table 1
Summary of Constituents of Concern – Soil/Sediment
Ashland/NSP Lakefront Superfund Site
Ashland, Wisconsin

All units are milligrams per kilogram (mg/kg).

Analytical Parameters	Region 9 ¹		Target Lab ²
	PRG		
SVOCs	Residential	Commercial/Industrial	DL
Acenaphthene	3,682	29,219	3,682
Acenaphthylene ³	3,682	29,219	3,682
Anthracene	21,896	100,000	21,896
Benzo(a)anthracene	0.62	2.11	0.62
Benzo(a)pyrene	0.062	0.21	0.062
Benzo(e)pyrene ³	0.062	0.21	0.062
Benzo(b)fluoranthene	0.62	2.11	0.62
Benzo(k)fluoranthene	6.2	21	6.2
Benzo(ghi)perylene ³	2,316	29,126	2,316
Chrysene	62	211	62
Dibenzo(a,h)anthracene	0.062	0.21	0.062
Fluoranthene	2,294	22,000	2,294
Fluorene	2,747	26,281	2,747
Indeno(1,2,3-cd)pyrene	0.62	2.1	0.62
1-Methylnaphthalene ³	56	188	56
2-Methylnaphthalene ³	56	188	56
Naphthalene	56	188	56
Phenanthrene ³	2,316	29,126	2,316
Pyrene	2,316	29,126	2,316
Dibenzofuran	291	3,127	291
Phenol	36,662	100,000	36,662
2-Methylphenol	3,055	30,780	3,055
3-Methylphenol	3,055	30,780	3,055
4-Methylphenol	306	3,078	306
Inorganics			
Arsenic	0.39	1.6	0.39
Aluminum	76,142	100,000	76,142
Antimony	31	409	31
Barium	5,375	66,577	5,375
Beryllium	154	1,941	154
Cadmium	37	451	37
Calcium	EN	EN	EN
Chromium (+3)	100,000	100,000	100,000
Chromium (+6)	30	64	30
Cobalt	903	1,921	903
Copper	3,129	40,877	3,129
Cyanide	1,222	12,313	1,222
Iron	23,463	100,000	23,463
Lead	400	750	400
Magnesium	EN	EN	EN
Manganese	1,762	19,458	1,762

Table 1
Summary of Constituents of Concern – Soil/Sediment
Ashland/NSP Lakefront Superfund Site
Ashland, Wisconsin

All units are milligrams per kilogram (mg/kg).

All units are milligrams per kilogram (mg/kg).			
Analytical Parameters	Region 9 ¹		Target Lab ²
	PRG		
Mercury	23	307	23
Nickel	1,564	20,439	1,564
Potassium	EN	EN	EN
Selenium	391	5,110	391
Silver	391	5,110	391
Sodium	EN	EN	EN
Thallium	5	67	5
Vanadium	547	7,154	547
Zinc	23,463	100,000	23,463
VOCs			
Benzene	0.6	1.3	0.6
sec-Butylbenzene	220	220	220
Ethylbenzene	9	20	9
Styrene	1,700	1,700	1,700
Toluene	520	520	520
1,2,4-Trimethylbenzene	52	170	52
1,2,3-Trimethylbenzene ³	52	170	52
Total Xylenes	275	420	275

Notes:

¹Preliminary Remediation Goals (PRGs) taken from the Region 9 PRG Table (USEPA, October, 2002).

²Target detection limit (DL) is the minimum value of the residential and commercial/ industrial soil PRG. In the absence of sediment PRGs for the human health PRGs, the soil PRGs will be used to establish sediment DLs.

³A Region 9 PRG is not available for these chemicals, a suitable surrogate was selected as indicated below:

Acenaphthene was used as a surrogate for acenaphthylene.

Benzo(a)pyrene was used as a surrogate for benzo(e)pyrene.

Naphthalene was used as a surrogate for 1-methylnaphthylene and 2-methylnaphthalene.

Pyrene was used as a surrogate for benzo(ghi)perylene and phenanthrene.

1,2,4-Trimethylbenzene was used as a surrogate for 1,2,3-trimethylbenzene.

EN indicates that USEPA identifies these inorganics as essential nutrients. There are no PRGs available for these compounds.

Table 2
Summary of Constituents of Concern
Groundwater Detection Levels
Ashland/NSP Lakefront Superfund Site
Ashland, Wisconsin

All units are micrograms per liter (µg/L).

Analytical Parameters	Region 9¹ Tap-water PRG	Target Lab² DL
SVOCs		
Acenaphthene	365	365
Acenaphthylene ³	365	365
Anthracene	1,825	1,825
Benzo(a)anthracene	0.092	0.092
Benzo(a)pyrene	0.0092	0.0092
Benzo(e)pyrene ³	0.0092	0.0092
Benzo(b)fluoranthene	0.09	0.092
Benzo(k)fluoranthene	0.9	0.92
Benzo(ghi)perylene ³	183	183
Chrysene	9.2	9.2
Dibenzo(a,h)anthracene	0.0092	0.0092
Fluoranthene	1,460	1,460
Fluorene	243	243
Indeno(1,2,3-cd)pyrene	0.092	0.092
1-Methylnaphthalene ³	6.2	6.2
2-Methylnaphthalene ³	6.2	6.2
Naphthalene	6.2	6.2
Phenanthrene ³	183	183
Pyrene	183	183
Dibenzofuran	24.3	24.3
Phenol	21,900	21,900
2-Methylphenol	1,825	1,825
3-Methylphenol	1,825	1,825
4-Methylphenol	182	182
Inorganics		
Arsenic	0.045	0.04
Aluminum	36,499	36,499
Antimony	15	15
Barium	2,555	2,555
Beryllium	73	73
Cadmium	18	18
Calcium	EN	EN
Chromium (+3)	54,747	54,747
Chromium (+6)	109	109
Cobalt	730	730
Copper	1,460	1,460
Cyanide	730	730
Iron	10,950	10,950
Lead	0.0036	0.0036
Magnesium	EN	EN
Manganese	876	876
Mercury	11	11

Table 2
Summary of Constituents of Concern
Groundwater Detection Levels
Ashland/NSP Lakefront Superfund Site
Ashland, Wisconsin

All units are micrograms per liter (µg/L).

Analytical Parameters	Region 9¹ Tap-water PRG	Target Lab² DL
Nickel	730	730
Potassium	EN	EN
Selenium	182	182
Silver	182	182
Sodium	EN	EN
Thallium	2.4	2.4
Vanadium	255	255
Zinc	10,950	10,950
VOCs		
Benzene	0.34	0.34
sec-Butylbenzene	243	243
Ethylbenzene	2.9	2.9
Styrene	1,641	1,641
Toluene	723	723
1,2,4-Trimethylbenzene	12.3	12.3
1,2,3-Trimethylbenzene ³	12.3	12.3
Total Xylenes	210	210

Notes:

¹Preliminary Remediation Goals (PRGs) taken from the Region 9 PRG Table (USEPA, October, 2002).

²Target detection limit (DL) is equal to the tap-water PRG.

³A Region 9 PRG is not available for these chemicals, a suitable surrogate was selected as indicated below:

Acenaphthene was used as a surrogate for acenaphthylene.

Benzo(a)pyrene was used as a surrogate for benzo(e)pyrene.

Naphthalene was used as a surrogate for 1-methylnaphthlene and 2-

Pyrene was used as a surrogate for benzo(ghi)perylene and phenanthrene.

1,2,4-Trimethylbenzene was used as a surrogate for 1,2,3-trimethylbenzene.

EN indicates that USEPA identifies these inorganics as essential nutrients. There are no PRGs available for these compounds.

Table 3
Summary of Constituents of Potential Concern and Screening Values of Indoor Air
Ashland NSP Lakefront Superfund Site
Ashland , Wisconsin

Chemical	Target Indoor Air Concentration (R=10 ⁻⁶ , HI=1) ¹	
	µg/m ³	ppbv
1,1,1-Trichloroethane	2.20E+03	4.00E+02
1,1,2,2-Tetrachloroethane	4.20E-02	6.10E-03
1,1,2-Trichloroethane	1.50E-01	2.80E-02
1,1-Dichloroethane	5.00E+02	1.20E+02
1,1-Dichloroethene	2.00E+02	5.00E+01
1,2,4-Trichlorobenzene	2.00E+02	2.70E+01
1,2,4-Trimethylbenzene	6.00E+00	1.20E+00
1,2-Dibromoethane (EDB)	1.10E-02	1.40E-03
1,2-Dichlorobenzene	2.00E+02	3.30E+01
1,2-Dichloroethane	9.40E-02	2.30E-02
1,2-Dichloropropane	4.00E+00	8.70E-01
1,3,5-Trimethylbenzene	6.00E+00	1.20E+00
1,3-Dichlorobenzene	1.10E+02	1.70E+01
1,4-Dichlorobenzene	8.00E+01	1.30E+02
Benzene	3.10E-01	9.80E-02
Benzyl chloride	5.00E-02	9.70E-03
Bromomethane	5.00E+00	1.30E+00
Carbon tetrachloride	1.60E-01	2.60E-02
Chlorobenzene	6.00E+01	1.30E+01
Chloroethane	1.00E+04	3.80E+03
Chloroform	1.10E-01	2.20E-02
Chloromethane	2.40E+00	1.20E+00
cis-1,2-Dichloroethene	3.50E+01	8.80E+00
cis-1,3-Dichloropropene	6.10E-01	1.30E-01
Dichlorodifluoromethane	2.00E+02	4.00E+01
Ethylbenzene	2.20E+00	5.10E-01
Hexachlorobutadiene	1.10E-01	1.00E-02
m-Xylene	7.00E+03	1.60E+03
o-Xylene	7.00E+03	1.60E+03
p-Xylene	7.00E+03	1.60E+03
Methylene chloride	5.20E+00	1.50E+00
Styrene	1.00E+03	2.30E+02
Tetrachloroethene	8.10E-01	1.20E-01
Toluene	4.00E+02	1.10E+02
trans-1,3-Dichloropropene	6.10E-01	1.30E-01
Trichloroethene	2.20E-02	4.10E-03
Trichlorofluoromethane	7.00E+02	1.20E+02
Vinyl chloride	2.80E-01	1.10E-01

µg/m³ – micrograms per cubic meter

ppbv – parts per billion by volume

Values taken from Table 2c as presented in *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (USEPA, 2002).

¹Based on a risk level of 1E-06 and a hazard index of 1.

Table 4
Summary of Constituents of Concern and Screening Values for Soil Vapor
Ashland NSP Lakefront Superfund Site
Ashland, Wisconsin

	Target Shallow Gas ¹ Concentration			Target Deep Soil Gas ² Concentration	
Chemical	µg/m ³	ppbv		µg/m ³	ppbv
1,1,1-Trichloroethane	2.20E+04	4.00E+03		2.20E+05	4.00E+04
1,1,2,2-Tetrachloroethane	4.20E-01	6.10E-02		4.20E+00	6.10E-01
1,1,2-Trichloroethane	1.50E+00	2.80E-01		1.50E+01	2.80E+00
1,1-Dichloroethane	5.00E+03	1.20E+03		5.00E+04	1.20E+04
1,1-Dichloroethene	2.00E+03	5.00E+02		2.00E+04	5.00E+03
1,2,4-Trichlorobenzene	2.00E+03	2.70E+02		2.00E+04	2.70E+03
1,2,4-Trimethylbenzene	6.00E+01	1.20E+01		6.00E+02	1.20E+02
1,2-Dibromoethane (EDB)	1.10E-01	1.40E-02		1.10E+00	1.40E-01
1,2-Dichlorobenzene	2.00E+03	3.30E+02		2.00E+04	3.30E+03
1,2-Dichloroethane	9.40E-01	2.30E-01		9.40E+00	2.30E+00
1,2-Dichloropropane	4.00E+01	8.70E+00		4.00E+02	8.70E+01
1,3,5-Trimethylbenzene	6.00E+01	1.20E+01		6.00E+02	1.20E+02
1,3-Dichlorobenzene	1.10E+03	1.70E+02		1.10E+04	1.70E+03
1,4-Dichlorobenzene	8.00E+03	1.30E+03		8.00E+04	1.30E+04
Benzene	3.10E+00	9.80E-01		3.10E+01	9.80E+00
Benzyl chloride	5.00E-01	9.70E-02		5.00E+00	9.70E-01
Bromomethane	5.00E+01	1.30E+01		5.00E+02	1.30E+02
Carbon tetrachloride	1.60E+00	2.60E-01		1.60E+01	2.60E+00
Chlorobenzene	6.00E+02	1.30E+02		6.00E+03	1.30E+03
Chloroethane	1.00E+05	3.80E+04		1.00E+06	3.80E+05
Chloroform	1.10E+00	2.20E-01		1.10E+01	2.20E+00
Chloromethane	2.40E+01	1.20E+01		2.40E+02	1.20E+02
cis-1,2-Dichloroethene	3.50E+02	8.80E+01		3.50E+03	8.80E+02
cis-1,3-Dichloropropene	6.10E+00	1.30E+00		6.10E+01	1.30E+01
Dichlorodifluoromethane	2.00E+03	4.00E+02		2.00E+04	4.00E+03
Ethylbenzene	2.20E+01	5.10E+00		2.20E+02	5.10E+01
Hexachlorobutadiene	1.10E+00	1.10E-01		1.10E+01	1.00E+00
m-Xylene	7.00E+04	1.60E+04		7.00E+05	1.60E+05
o-Xylene	7.00E+04	1.60E+04		7.00E+05	1.60E+05
p-Xylene	7.00E+04	1.60E+04		7.00E+05	1.60E+05
Methylene chloride	5.20E+00	1.50E+00		5.20E+02	1.50E+02
Styrene	1.00E+04	2.30E+03		1.00E+05	2.30E+04
Tetrachloroethene	8.10E+00	1.20E+00		8.10E+01	1.20E+01
Toluene	4.00E+03	1.10E+03		4.00E+04	1.10E+04
trans-1,3-Dichloropropene	6.10E+00	1.30E+00		6.10E+01	1.30E+01
Trichloroethene	2.20E-01	4.10E-02		2.20E+00	4.10E-01
Trichlorofluoromethane	7.00E+03	1.20E+03		7.00E+04	1.20E+04
Vinyl chloride	2.80E+00	1.10E+00		2.80E+01	1.10E+01

Notes:

$\mu\text{g}/\text{m}^3$ – micrograms per cubic meter

ppbv – parts per billion by volume

Values taken from Table 2c as presented in *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (USEPA, 2002)*.

¹Shallow soil gas concentration corresponding to the Target Indoor Air Concentration presented in Table 3.
Shallow is defined as less than 5 feet below foundation level.

²Deep soil gas concentration corresponding to the Target Indoor Air Concentration presented in Table 3.
Deep is defined as greater than 5 feet below foundation level.

³Target groundwater concentration corresponding to the Target Indoor Air Concentration presented in Table 3.

Table 5
Summary of Sampling and Analysis Program
Ashland/NSP Lakefront Superfund Site

Sample Matrix	Field Parameters	Laboratory Parameters	Sample No.	Field Duplicate	Equipment Blank	MS/MSD ^{1,2}	Matrix ³
Surface Soil – AC1	Soil Gas	VOCs	12	2	1	1	15
	Screening	SVOCs	12	2	1	1	15
	w/ PID	Metals ⁴	12	2	1	1	15
Subsurface Soil – AC 1	Soil Gas	VOCs	114	12	6	6	132
	Screening	SVOCs	114	12	6	6	132
	w/ PID	Metals ⁴	114	12	6	6	132
Subsurface Soil – AC 3	Soil Gas	VOCs	20	2	1	1	23
	Screening	SVOCs	20	2	1	1	23
	w/ PID	Metals ⁴	20	2	1	1	23
Groundwater- AC 1	Temperature	VOCs	16	2	2	1	19
	PH	SVOCs	16	2	2	1	19
	Conductivity	Metals ⁵	16	2	2	1	19
Groundwater- AC 2 ⁶	Temperature	VOCs	41	5	3	3	49
	PH	SVOCs	41	5	3	3	49
	Conductivity	Metals ⁵	41	5	3	3	49
Groundwater- AC 3 ⁸	Temperature	VOCs	10	2	1	1	13
	PH	SVOCs	10	2	1	1	13
	Conductivity	Metals ⁵	10	2	1	1	13
Test Pit AC 3	Soil Gas	VOCs	19	2	1	1	22
	Screening	SVOCs	19	2	1	1	22
	w/ PID	Metals	19	2	1	1	22
Soil Gas – AC 1	Vapor	VOCs	7	--	--	--	7
Indoor Air – AC 1	Vapor	VOCs	3	--	--	--	3
Sediment/Fish Tissue	A final sampling program for AC 4 will be completed following a reconnaissance survey, scheduled for late spring 2004						

The field quality control samples also include trip blanks, which are required for VOC water samples. One trip blank, which consists of two preserved 40-ml vials is shipped with each shipping cooler of VOC vials.

1. Additional volume is required for MS/MSD samples for organic water analysis. Samples designated for MS/MSD analysis will be collected, with extra sample volume, at a frequency of one per group of 20 or fewer investigative samples. Triple the normal sample volumes will be collected for VOCs, and double the normal sample volumes will be collected for semivolatiles
2. MS/MSDs are collected at a rate of 1 for every 20 samples.
3. The number of equipment and trip blanks are not included in the matrix total. Trip blanks will only to be used during the transport of groundwater samples.
4. Includes total cyanide and hexavalent chromium analyses.
5. Include only total cyanide analyses.
6. The sample numbers indicates 6 new piezometers, 39 groundwater wells, and 2 artesian wells.
7. Sample collection is dependent upon the identification of solid waste. Additional analyses may include Toxicity Characteristic Leaching Procedure (TCLP) for hazardous constituents.

Table 6¹
DQO Steps for the Remedial Investigation
Ashland/NSP Lakefront Superfund Site

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
State the Problem	Identify the Decision	Identify Inputs to the Decision	Define Study Boundaries	Develop Decision Rules	Specify Limits on the Decision Errors	Optimize Sampling Design
A defined vertical and horizontal extent of contamination in the soil and groundwater is needed in AC 1, AC 2 and AC 3 with respect to PRG values for the site.	What are both the horizontal and vertical extents of contamination in AC 1, AC 2, and AC3 with respect to PRG values for the site?	Validated defensible VOC, SVOC and metals analyses with sufficiently low detection limits to correspond to PRG values.	<p>Soil samples will be collected from Geoprobe borings for analysis at a rate of 3 per boring and analyzed for select VOCs, SVOCs and metals.</p> <p>Additional subsurface soil samples will also be collected from Geoprobe borings to evaluate background conditions. Samples will be collected and analyzed for select VOCs, SVOCs and metals.</p> <p>Surface soil samples will be collected from unpaved areas around the former MGP facility.</p> <p>Groundwater samples will be collected from existing and new monitoring wells and piezometers and analyzed for select VOCs, SVOCs and metals.</p>	If chemical data passes validation assessment and data detection limits are less than PRGs, then data set will be accepted for Area characterization.	Data validation will use specified evaluation criteria. Comparison of validated data will be against specified PRG values that have been agreed to by the regulatory agencies.	<p>Geoprobe borings will be advanced a minimum of five feet below the base of the filled ravine, or to a maximum depth of 20 feet.</p> <p>Geoprobe borings will be advanced up gradient of the fill ravine. Soil samples will be selected for analysis.</p> <p>Surface soil samples will be collected at various locations around the property. The locations are shown on Figure 4.</p> <p>An additional seven piezometers will be installed as shown on Figure 4.</p>

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
State the Problem	Identify the Decision	Identify Inputs to the Decision	Define Study Boundaries	Develop Decision Rules	Specify Limits on the Decision Errors	Optimize Sampling Design
<p>The extent of DNAPL in each Area needs to be defined</p> <p>The contaminant migration pathways and fate and transport of contaminants needs to be defined.</p>	<p>What is extent of DNAPL in the groundwater?</p> <p>What are the contaminant migration pathways and fate and transport of contaminants?</p>	<p>Validated water level and DNAPL measurements.</p> <p>Validated defensible VOC, SVOC and metals analyses with sufficiently low detection limits to correspond to PRG values.</p>	<p>Collect water level and DNAPL measurements from all existing and proposed monitoring wells and piezometers.</p> <p>Soil samples will be collected from Geoprobe borings for analysis at a rate of 1 per 10 feet and analyzed for select VOCs, SVOCs and metals.</p> <p>Additional subsurface soil samples will also be collected from Geoprobe borings to evaluate background conditions. Samples will be collected and analyzed for select VOCs, SVOCs and metals.</p> <p>Surface soil samples will be collected from unpaved areas around the former MGP facility.</p> <p>Groundwater samples will be collected from existing and new monitoring wells and piezometers and analyzed for select VOCs, SVOCs and metals.</p>	<p>If data passes validation assessment, then data set will be accepted for Area characterization.</p> <p>If data passes validation assessment, then data set will be accepted for pathway and fate and transport characterization.</p>	<p>Data validation will use specified evaluation criteria.</p> <p>Data validation will use specified evaluation criteria.</p>	<p>Collect water level and DNAPL measurements from all existing and proposed monitoring wells and piezometers.</p> <p>37 Geoprobe borings will be advanced a minimum of five feet below the base of the filled ravine, or to a maximum depth of 20 feet. The borings will be located as shown on Figure 4.</p> <p>3 Geoprobe borings will be advanced up gradient of the fill ravine. Seven soil samples will be selected for analysis. The borings will be located as shown on Figure 4.</p> <p>Twelve surface soil samples will be collected at various locations around the property. The locations are shown on Figure 4.</p> <p>Additional piezometers will be installed.</p>

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
State the Problem	Identify the Decision	Identify Inputs to the Decision	Define Study Boundaries	Develop Decision Rules	Specify Limits on the Decision Errors	Optimize Sampling Design
Chemical data is needed to conduct human health and ecological risk assessments.	What are the most critical areas in AC 1, aC 2 and AC 3 to gather data for human health and ecological risk assessments?	Validated defensible VOC, SVOC and metals analyses with sufficiently low detection limits to correspond to PRG values.	<p>Soil samples will be collected from Geoprobe borings for analysis at a rate of 3 per boring and analyzed for select VOCs, SVOCs and metals.</p> <p>Additional subsurface soil samples will also be collected from Geoprobe borings to evaluate background conditions. Samples will be collected and analyzed for select VOCs, SVOCs and metals.</p> <p>Surface soil samples will be collected from unpaved areas around the former MGP facility.</p> <p>Groundwater samples will be collected from existing and new monitoring wells and piezometers and analyzed for select VOCs, SVOCs and metals.</p>	If data passes validation assessment, then data set will be accepted for risk assessments.	Data validation will use specified evaluation criteria.	<p>Geoprobe borings will be advanced a minimum of five feet below the base of the filled ravine, or to a maximum depth of 20 feet.</p> <p>Geoprobe borings will be advanced up gradient of the fill ravine. Seven soil samples will be selected for analysis.</p> <p>12 surface soil samples will be collected at various locations around the property.</p> <p>Additional piezometers will be installed.</p>

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
State the Problem	Identify the Decision	Identify Inputs to the Decision	Define Study Boundaries	Develop Decision Rules	Specify Limits on the Decision Errors	Optimize Sampling Design
Chemical data is necessary to evaluate potential Remedial Alternatives.	What are the potential remedial alternatives?	Validated defensible VOC, SVOC and metals analyses with sufficiently low detection limits to correspond to PRG values.	<p>Soil samples will be collected from Geoprobe borings for analysis at a rate of 1 per 10 feet and analyzed for select VOCs, SVOCs and metals.</p> <p>Additional subsurface soil samples will also be collected from Geoprobe borings to evaluate background conditions. Samples will be collected and analyzed for select VOCs, SVOCs and metals.</p> <p>Surface soil samples will be collected from unpaved areas around the former MGP facility.</p> <p>Groundwater samples will be collected from existing and new monitoring wells and piezometers and analyzed for select VOCs, SVOCs and metals.</p>	If data passes validation assessment, then data set will be accepted for use in determining remedial alternatives.	Data validation will use specified evaluation criteria.	<p>Geoprobe borings will be advanced a minimum of five feet below the base of the filled ravine, or to a maximum depth of 20 feet.</p> <p>Geoprobe borings will be advanced up gradient of the fill ravine. Soil samples will be selected for analysis.</p> <p>12 surface soil samples will be collected at various locations around the property.</p> <p>Additional piezometers will be installed.</p>

The DQOs for AC 4 (Chequamegon Bay) are not included in this QAPP. The DQOs are described in the RI/FS Work Plan, Section 4.1.

Table 7
QA Objectives for Field Measurements
Ashland/NSP Lakefront Superfund Site

Parameter	Method Reference	Precision	Accuracy	Completeness
Standing Water Levels	Solinst	± 0.01 ft.	0.005 ft.	95%
Monitoring Well Water Temperature	E170.1, Electronic Temperature Probe	± 0.5 degrees C	1.0 degrees C	95%
Conductivity	E120.1, Electrometric	± 25	10 uhmo/cm ²	95%
pH	E150.1, Electrometric	± 0.1 pH units	0.05 pH units	95%
Turbidity	E180.1	10 NTU	0.5 NTU	95%
Dissolved Oxygen	ASTM - A4500	± 0.05 mg/L	± 0.1 mg/L	95%

Table 8
QA Objectives for Laboratory Measurements
Ashland/NSP Lakefront Superfund Site

Laboratory-Specific Matrix Spike Recovery and Relative Percent Difference Limits¹				
	% Recovery		%RPD	
	Water	Soil	Water	Soil
VOCs (Method 8260B)				
1,1- Dichloroethene	61-145	67-112	14	29
Trichloroethene	74-126	59-140	22	29
Benzene	76-127	77-115	18	23
Toluene	71-132	79-120	19	21
Chlorobenzene	83-120	85-109	15	14
SVOCs (Method 8270C)				
Phenol	24-62	26-120	23	39
2-Chlorophenol	37-100	36-109	23	24
1,4-Dichlorobenzene	45-94	42-103	22	21
N-Nitroso-di-n-propylamine	50-103	23-126	22	22
1,2,4 –Trichlorobenzene	56-99	34-117	23	35
4-Chloro-3-Methylphenol	52-109	50-116	20	26
Acenaphthene	67-110	56-117	18	21
4-Nitrophenol	0-67	0-136	86	46
2,4-Dinitrotoluene	63-112	44-123	18	21
Pentachlorophenol	0-106	4-136	79	34
Pyrene	67-113	51-114	18	27
PAHs (Method 8310)				
Naphthalene	64-117	NA	19	NA
Acenaphthylene	61-120	NA	20	NA
Methyl-1-Naphthalene	58-108	NA	22	NA
Methyl-2-Naphthalene	58-108	NA	19	NA
Acenaphthalene	66-110	NA	18	NA
Fluorene	72-114	NA	17	NA
Phenathrene	73-17	NA	15	NA
Anthracene	69-115	NA	22	NA

Table 8
QA Objectives for Laboratory Measurements
Ashland/NSP Lakefront Superfund Site

Laboratory-Specific Matrix Spike Recovery and Relative Percent Difference Limits¹				
	% Recovery		%RPD	
	Water	Soil	Water	Soil
Fluoranthene	74-117	NA	15	NA
Pyrene	65-121	NA	15	NA
Benzo (a) anthracene	69-115	NA	16	NA
Chrysene	72-120	NA	14	NA
Benzo (b) fluoranthene	68-112	NA	17	NA
Benzo (k) Fluoranthene	71-114	NA	15	NA
Benzo (a) pyrene	67-119	NA	20	NA
Dibenzo (a,h) anthracene	64-113	NA	17	NA
Benzo (g,h,i) perylene	58-111	NA	16	NA
Indeno (1,2,3-cd) pyrene	62-124	NA	21	NA
Inorganics	Dissolved		Dissolved	
Arsenic	79-127	75-125	16	20
Aluminum	85-115	75-125	20	20
Antimony	85-115	75-125	20	20
Barium	83-116	75-125	8	20
Beryllium	88-116	75-125	4	20
Cadmium	84-117	66-113	5	10
Calcium	67-137	75-125	4	20
Chromium (+3)	80-120	75-125	20	20
Chromium (+6)	79-114	75-125	14	20
Cobalt	85-115	75-125	20	20
Copper	84-116	61-117	4	20
Cyanide (Total)	81-118	80-120	9	20
Iron	79-121	75-125	4	20
Lead	83-117	58-123	3	24
Magnesium	70-130	75-125	5	20
Manganese	82-119	75-125	5	20
Mercury	73-115	0-180	15	45
Nickel	71-114	59-107	3	20

Table 8
QA Objectives for Laboratory Measurements
Ashland/NSP Lakefront Superfund Site

Laboratory-Specific Matrix Spike Recovery and Relative Percent Difference Limits¹					
		% Recovery		%RPD	
		Water	Soil	Water	Soil
	Potassium	85-115	75-125	20	20
	Selenium	85-115	75-125	20	20
	Silver	66-119	75-125	10	20
	Sodium	85-115	75-125	20	20
	Thallium	85-115	75-125	20	20
	Vanadium	84-120	75-125	4	20
	Zinc	88-118	75-125	3	20

1. Northern Lake Service QC LIMITS (02/11/2004)

Table 9
Sample Container Preservation and Holding Time Requirements for Analytical Samples
Ashland/NSP Lakefront Superfund Site

Matrix	Analysis	Container	Preservation	Holding Time
Groundwater	VOCs	2, 40-mL glass vials	HCL to pH<2, cool to 4 degrees C	Maximum of 14 days
	SVOCs	2, 1-L amber glass jars	Unpreserved, cool to 4 degrees C	7 days until extraction
	Metals	500 mL plastic bottle	HNO ₃ to pH<2	Maximum of 6 months; mercury less than 30 days
	Cyanide	500 mL plastic bottle	NaOH to pH>10, cool to 4 degrees C	Maximum of 14 days
Soil and Sediments ¹	VOCs	3, EnCore devices or alternate SW846 Method 5035 method	Cool to 4 degrees C	14 days until extraction
	SVOCs	4 ounce glass jar	Unpreserved, cool to 4 degrees C	14 days until extraction
	Metals	4 ounce glass jar	Unpreserved	Maximum of 6 months; mercury less than 30 days
Soil Gas/Vapor ²	VOCs	Summa Canister	Unpreserved; no chemical preservation	Maximum of 30 days
DNAPL	TBD	4 ounce glass jar	Unpreserved	Method-specific ³
Sediments	TBD	Method-specific	Method-specific	Method-specific ³
Fish Tissue	TBD	Method-specific	Method-specific	Method-specific ³
Invertebrate	TBD	Method-specific	Method-specific	Method-specific ³

TBD – To be determined.

1. Sediments will be analyzed for parameters groups as specified in the FSP.
2. Analysis will be performed for TO-15 only.
3. Holding times for conventional parameter groups (e.g., PCBs) for these matrices will be the same as those identified in USEPA guidance documents (e.g, SW846). Non-conventional parameters (e.g, lipids) will be analyzed on a 3-day turnaround time.

Table 10
Field Preventative Maintenance Procedures and Frequencies of Checks
Ashland/NSP Lakefront Superfund Site

Instrument	Maintenance Procedures/Schedule	Spare Parts
RAE Systems Mini RAE 2000 Photoionization Detector	1. Calibrate the beginning of each day and as necessary during use. 2. Check battery and recharge when low. 3. Clean lamp as needed.	1. Battery charger 2. Spare lamps
pH Meter	1. Calibrate beginning and end of each day, and as necessary during use. 2. Replace electrodes as needed.	1. Batteries 2. pH Buffers 3. Spare electrodes
Conductivity Meter	1. Calibrate beginning and end of each day, and as necessary during use. 2. Check redline and replace batteries if does not calibrate.	1. Batteries

Table 11
Examples of Maintenance Procedures and Frequencies for Major Analytical Instrumentation
Ashland/NSP Lakefront Superfund Site

Instrument	Activity	Frequency
Gas Chromatograph/ Mass Spectrometer	Check Vacuum Manifold Pressure Check Rough Pump Oil Level Check Pressure of Carrier Gas Check CAL Gas Vial Refill CAL Gas Vial Replace Rough Pump Oil Replace Rough Pump Trap Pellets Check Diffusion Oil Pump Replace Diffusion Oil Pump Clean Ion Source Replace Oxygen Carrier Gas Trap Replace Filament and Multiplier Replace Injector Septa Replace injection port glass insert & O- ring, gold seal & washer	Daily Weekly Weekly Monthly As needed Every three months Every six months Yearly As needed As needed As needed/poor sensitivity As needed/poor sensitivity As needed/100 injections As needed/poor sensitivity
Inductively coupled argon plasma emission spectrometer	Replace Peristaltic Pump Tubing Empty Waste Carboy Check sample uptake lines for plugs Check Argon Pressure Reset Instrument Communications Board Reset Nebulizer Pressure Switch	Daily Daily/As needed Daily Daily Daily Daily
High pressure Liquid chromatograph	Replace guard column and pre-column Replace pump seals Replace the injection motor. Back flush column with isopropanol, acetonitrile, and 40/60 solution of acetonitrile	Daily Daily/As needed Daily Daily Daily Daily

FIGURES

APPENDICIES

APPENDIX A

URS STANDARD OPERATING PROCEDURES

APPENDIX B

NORTHERN LAKE SERVICE, INC. QUALITY ASSURANCE/QUALITY CONTROL MANUAL AND PROJECT SPECIFIC ATTACHMENTS

APPENDIX C

SEVERN TRENT LABORATORY, INC. QUALITY ASSURANCE/QUALITY CONTROL MANUAL AND PROJECT SPECIFIC ATTACHMENT